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Potential Market for Motor Trucks in the Colorado District

Agricultural Field Offers Vast Possibilities. One and a Half to Two-Ton Trucks Best Adapted to Beet Sugar Industry. Better Sales Methods Needed

By A. V. COMINGS

IN considering the Colorado district, from the standpoint of motor truck sales and distribution, the eastern manufacturer will first have to realize that this district comprises not only the great State of Colorado but also includes the southern half of Wyoming, a slice off the western end of Nebraska, part of western Kansas and that it also dips down into New Mexico. This is a territory about 400 miles square. And the State of Pennsylvania is only 300 miles long and about 150 miles wide. Consider also that railroads are few and far between, passenger schedules call for infrequent trains, and you will realize the difficulties under which the Colorado distributor labors. As a matter of fact if it were not for automobiles, the distributor would find it very difficult to cover his territory anywhere nearly as efficiently as he now does it.

Denver, of course, is the distributing center for motor trucks in this territory, and at the present time approximately 48 different motor truck manufacturers are represented there, including the Pacific coast group.

Resources of the Colorado District

The sale of motor trucks, in any district, depends entirely on whether that district has anything that trucks may transport efficiently; the number sold must naturally depend on the quantity and class of products produced, and whether it is necessary to move any great part of these products from one place to another.

The Colorado district produces such a variety of products, and it is so vitally necessary that these be transported from one place to another over highways and that supplies for those engaged in producing be transported from railroad to country, that the future of the motor truck in this district looks very bright indeed.

During the past year or two the oil fields centering at Casper, Wyo., have been the biggest single user of motor trucks out of the Colorado territory, and like other oil fields over the country, whole fleets of trucks have carried in supplies and men, handled the heavy drilling and pumping equipment, and have stood up under the most adverse conditions. For this work the trucks of 2 and 2½ tons capacity, of the heavier, more expensive type, have been the biggest sellers, and these have almost without exception been fitted with special "oil field" bodies, built mostly at Denver or in the field, for carrying pipes, drills, casings, and miscellaneous equipment. Standard platform and stake bodies, as known in the cities, are not practical in this work.

At present there is no let up in the demand for trucks in the Casper district, as new wells are being brought in consistently and the old ones are flowing strong.

Mr. Comings, known to many in the trade as "A. V." is making a three months' trip through the western part of the country, for the purpose of gathering first hand information as to the potential market and sales possibilities for motor trucks, passenger cars and tractors, in various sections. The information gathered in this survey, as relating to the motor truck industry, will be published in subsequent issues of the Commercial Car Journal.

Many Silver Mines Being Reopened

The boom in mining has been beneficial to the motor truck distributor in this district, as many "old dumps" are now being worked because of the high price of silver, and new mines have been opened. In many instances motor trucks have made it possible to open mining districts where it would not have paid to build railroads.

The 2- and 2½-ton sizes predominate in this field, usually with dump bodies, although the latter has not been the ideal body, inasmuch as the trucks often have to haul ore to the railroads and bring back a miscellaneous load of supplies to the mines.

For the present at least a limit is placed on the size of trucks used over most of Colorado roads, for it has been found that in the large sizes, where dual tread tires are used, the outer tire on the rear wheels goes to pieces very fast on account of not fitting down into the rut made by standard tread vehicles. Until there are more hard surfaced roads it will be hard to sell more than a limited quantity of the larger size trucks.

It is in agriculture that the motor truck will find its greatest market in the future through the Colorado distributor, however. This may sound strange to the eastern manufacturer who has thought of Colorado as a mining state exclusively, but it is an actual fact that even poultry products in Colorado last year were of greater value than the output of the state's gold mines.

The greatest present prospect in the agricultural field is in the beet sugar industry. The value of this crop last year was over seventeen million dollars, and the acreage sown to beets this year is greater than ever. Ten great factories, with more building, are strung through the district north of Denver where the beets grow, and every single beet has to be transported from the fields to the nearest railway either by horse-drawn vehicles or motor trucks.

Agricultural Field the Dealer's Best Bet

This means hauling 18,000 to 20,000 tons of beets over the highways every day for a period of about two months, to immense loading docks where the beets are dumped into cars. These docks are about 300 ft. long and 20 ft. high, the wagon or truck goes up a gradual incline to the top, dumps the beets from a side dump body, and goes on down a steeper incline on the other end of the dock.

Two handicaps have been met with by trucks in handling beets thus far, the weakness of some of the docks, and the necessity of standing in line with teams awaiting their turn to unload. The sugar companies are beginning to realize that the truck is going to be a factor in hauling beets and have promised to strengthen the docks and to give the trucks preference in unloading, so that their speed may be utilized to the utmost.

Last year farmers were paid $10 per ton for beets and made big money. This year the price is $12 per ton flat, with one dollar per ton added for every cent above eleven cents per pound that the company gets for sugar at seaboard. It is understood that the company figures

on paying about $16 per ton on this basis.

As the farmers are fast seeing the wisdom of buying trucks and as they will have the cash in hand after the crop is harvested this year, it would seem that among them is a real future for the truck dealer in that territory. Denver distributors are working on this theory.

Another reason for the farmer having his own truck in this section. The sugar beet pulp, after the sugar is extracted, is sold to the farmer for stock food and is a high class cattle fattener. And sugar beets and cattle are going together sure as fate in Colorado when the farmer awakens to his opportunities. Here is a typical instance:

H. A. McCarty, of La Salle, Col., bought a 1½-ton medium priced truck. With his horses he had been able to just haul enough beet pulp to keep his stock fed from day to day. With the truck he was able to carry his beets to the railroad, and haul enough pulp that he could store up some, enough so that he kept his cattle fattening thirty days after the beet season was over. And he paid for his truck out of his profits the first year!

"My neighbors laughed at me for buying the truck," said Mr. McCarty, "but I'm satisfied and they're not laughing now. They're considering buying trucks themselves."

From observation and talking with dealers and distributors in Colorado territory, I think there is a big future for the 1½- and 2-ton truck in the beet sugar industry.

Colorado's wheat crop last year topped $35,000,000, and its fruit crop, too, was tremendous. Add to this the cattle industry, and you have a big buying power which will figure in the truck market.

Most of the big ranches are some distance from the railroads, and t Colorado rancher of today is fast learning that hauling his products to the railroads and his supplies back by the old method is no longer satisfactory. That's why one dealer in a little town of 2000 sold seventeen trucks of a certain medium priced make last year. And there were others who nearly equaled the record.

One of the leading distributors in Denver states, "that one-half of Colorado remains to be made really available by the motor truck and the motor car, and that these agencies are fast opening vast tracts of land hitherto useless, because of lack of transportation."

Much timber is being handled from the mountains to nearest rail lines by trucks, the 3½-ton size, usually with a two-wheel trailer, doing this work. The future in this line is not considered particularly great, however.

Intercity motor freight haulage has not as yet been successful in the broad sense. Many lines have been started, and some are operating today, but the rates charged have been such that failure was inevitable. Until the hauling can be put on a real business basis and handled by business men, it will not be a success and will not be a factor in truck buying.

Of motor bus lines in this territory there are practically none. There are many stage lines, but these are usually handled by large bodied touring cars.

Owing to the roads and the heavy grades in many places, trailers are used but little in the Colorado territory.

Denver, with its population of 257,000, is the biggest city user of motor trucks, but it is a type of city requiring fewer trucks than cities of the same size in the east. Comparatively few trucks are used in coal haulage, for instance, because loading facilities for handling coal have never been developed, and too much time is used in loading trucks to make them economical. Wholesale houses generally, use motor trucks for distribution within a limited radius, and there are the usual transfer and other miscellaneous users. But the absolute lack of manufacturing enterprises requiring transportation makes the lack of trucks very noticeable on Denver streets, and the market in this city, while steady and consistent, will never be great.

Distributors and Dealers Need Reforming

Sales conditions in the Colorado territory are very bad. But they have been much worse, and distributors told me that conditions really are becoming better very perceptibly. Conditions last year are summed up in the following quotation from one of the biggest Denver distributors, and one of the cleanest:

"Of the twelve hundred trucks sold in this territory last year I venture to say that one-half of them were sold at no profit, and that forty per cent of those were sold at an actual loss."

It's the same old story of unsavory trade-ins, cut prices, anything to get the business, and a horde of small "peddlers" doing anything to get rid of their few trucks per year. And one of the biggest distributors has the worst reputation for unethical practices in making certain that his truck is bought, no matter what the price.

The dealers' organization in Denver has not as yet been able to actually get results in getting the truck dealers together, but from conversations with several of the distributors I would judge that the biggest in the field will shortly get on to a better working basis and the curbstone dealer will not enter into the equation as he has at times in the past.

Out of the so-called list of distributors in Denver, I would say from observation that there are not over a half dozen at the very outside who really deserve that name. These have establishments and a force large enough to handle both the sales and service intelligently, and do so to the best of their ability. Where their factories back them up with the proper service, they do their part.

Of the others the less said the better. They may or may not have a truck in stock; as to service they don't know the meaning of the word.

One "distributor" I talked with told of taking the distribution of the truck he handled, going out into the territory and getting seventeen "dealers", each one taking a truck, and never hearing from them again with the exception of two. Each "dealer" had merely wanted to get a truck at dealers' discount for his own use.

The usual thing in the Colorado territory is for the distributor to handle both trucks and passenger cars, usually in the same building. Gradually this is being changed, however, to the extent at least of using a separate building. But outside of Denver the connection is practically always in evidence, and probably will continue so, on account of conditions.

I found a few dealers in Denver who really understand the present day method of selling truck transportation, who are up to date, and who have vision and see beyond the present.

But for the most part, dealers in the Colorado district are men who see little beyond the day-by-day selling of their wares. The bigger deals in their respective territories are handled either by the district man or sales manager from Denver, and the prospect for improvement among these dealers is problematical. Occasionally there is an exception, but for the most part Denver distributors will tell you it is hard to get real truck dealers in their territory. Almost invariably they are passenger car dealers also, with trucks as a "side line". There are very few tractor-truck-passenger car combinations.

As one distributor said to me, "they want to grab it now rather than build for the future." The salesman usually sells from his standpoint, not from the standpoint of the man buying the truck.

Distributors generally say they note a gradual improvement in their dealers, however, and it is very probable that with a settling down of the business into standard lines in the future, the dealer and the salesman will develop slowly along with the development of the business as a whole.

Truck distributors are not wholly sold on pneumatics in their territory. Many are being used, where the roads are good, but some told me they have yet to be certain that they will prove economical on the hard mud rutty roads to be found in many parts of the territory. Time will test out the tires, however, and I have no doubt of the future of the pneumatic in this, as in other sections of the country.

In conclusion, I believe there is a real future for motor trucks in the Colorado district. Irrigation and the opening of new land is constantly adding to the resources of the district, and highway transportation is particularly a factor in a country which has so few railroads other than trunk lines.

The far sighted manufacturer, who is looking ahead to five and ten years from now, should have a **real** distributor in Denver, equipped to give real and prompt service. And, if the manufacturer is not ready to enter the Colorado territory, he should not allow a dealer or distributor to represent him there who is not financially and personally able to represent him properly. He will not only injure his own future in this district, but will do much to discredit motor trucks generally.

Fuel Situation and Transportation Chief Topics of Discussion at S. A. E. Summer Meeting

Over One Thousand Members and Guests Attend Ottawa Beach Outing. Fuel, Transportation, Power Farming and Kindred Subjects, Interspersed With an Elaborate Sports Program

By ALBERT G. METZ

OTTAWA BEACH, MICH., June 25.—To-day ended the five-day summer meeting of the Society of Automotive Engineers. Undoubtedly, this year's meeting was one of the most enjoyable that the members of this society ever attended. Although Monday morning's activities were opened under rather cool climatic conditions, Old Sol got real busy about noon and from then on clear skies and warm weather prevailed throughout the remainder of the week. Much credit is due to the members who had charge of the various sporting events and business sessions that took place during the week. That the engineers did not expect to do all work and no play was evidenced by the exceptional sports program which kept the visitors in good humor and gave all of them a chance at the $3000 worth of prizes that were distributed Thursday evening after the grand ball supper. This supper, by the way, was a misnomer. It was one of those cafeteria affairs. Any engineer who was not familiar with this "help yourself" service certainly had a splendid opportunity to become initiated.

A great many of the Detroit Section members came by automobile, in fact more members came this way than ever before. The special train which carried the eastern sections arrived late so that the Standards Sessions were somewhat delayed in starting. However, when B. B. Bachman, chairman of the Standards Committee, arrived, the meeting quickly got under way and the standards work was disposed of in record breaking time. Those standards of interest to motor truck and parts manufacturers are given elsewhere in this issue.

Monday evening Col. J. G. Vincent made his address in which he reviewed the work done by the society during the past six months, and outlined the work which the society is to undertake in the future. Col. Vincent praised the work done by the membership committee, the report of which shows that the number of members as of June 1st, 1920 is 4869. It is expected that the society will have over 5000 members by the end of the calendar year. Col. Vincent laid particular emphasis on the necessity of conserving fuel, and urged the members to use their influence in legislative matters. Extracts of his address are here given:

"The Automotive Industry generally, and particularly in relation to those branches having to do with passenger cars and trucks, is today facing a number of vital problems which if not carefully and intelligently considered in all their phases, may have an adverse effect, not only on the industry itself, but also on the economic phases of transportation.

"The first of these problems is the outgrowth of the banking policy instituted by the Federal Reserve Board to bring about a more sound financial condition of the country through a general restriction of credit which has taken the form of a discriminating attitude by many bankers toward the automobile industry.

"The second of these problems pertains to possible adverse legislation which may be the direct result, not only of mistaken attitude, but also of incomplete study and investigation of problems of highway transportation.

"The third problem is the rapid decline of our fuel reserve, indicating that unless our fuel production is enormously increased or conservation measures instituted, a general restriction of the growth of the Automotive Industry will result.

"Each of these problems is of vital economic concern and their fair and equitable solution can only be accomplished when the status of the automotive industry in our present economic scheme and the value of the motor car as a means of travel and transportation are fully appreciated.

"Of the total registration of motor cars in the United States in 1919, nearly one-third were owned by farmers. The reason for this great development is due partly to the greater accessibility to the more remote sections which previously required from several hours to a day or more to reach the nearest railroad or town.

"Not only does the passenger car possess utilitarian features for rural use, but also for universal betterment of community life.

"Another important factor which demonstrates the economic value of the truck and motor car in our present social structure is the important position which the Automotive Industry holds in our present industrial scheme. In 1919 the wholesale value of the combined production of passenger and commercial cars amounted to more than $1,885,000,000, or nearly $2,000,000,000, and it is estimated that if the value of parts and accessories manufactured during this period were added, the amount would be more than $2,500,000,000, involving the payment in

wages and salaries of nearly $814,000,000. These figures do not include the thousands of persons engaged in the retail phase of the business and the thousands who are employed in allied industries which depend solely on the demands created by the use of motor vehicles for their support.

"The second problem requiring serious attention concerns legislation pertaining to the construction and maintenance of improved highways and the necessary appropriation to carry out any constructive program. There have been many evidences of attempts to pass legislation which was in some cases not only unfair but even absurd.

"When the passenger car becomes considered as a standard means of transportation, the value of improved roads was generally appreciated and a movement to this end became nation-wide in character. With the increased utilization of the commercial car the problems of road construction became very different.

"The real test came during the winter of 1917-1918, when the combined effect of an extremely hard winter and the tremendous demand for the transportation of war munitions and supplies broke down the railroad service throughout the territory east of the Mississippi. The motor truck was pressed into service and during this period more than 1,200,000,000 tons of freight were moved by truck.

"With the motor truck firmly established by the war as an economic carrier its use is being more and more extended for short-haul transportation which is further accentuated by the present critical condition of railway service. As a result of this wide application of the truck, deterioration of highways has been extremely rapid. Some of these roads have even been partially rebuilt but of the same construction as originally and as a consequence they are soon destroyed.

"The legislatures are morally bound to supply improved highways suitable for use by trucks but the many problems involved should be thoroughly studied in order that the most economical balance be attained. Not only must present conditions be considered but the anticipated extension of the use of the motor truck should be taken into account.

"Types of commercial cars should be studied with special reference to weight, speed, load distribution and tire equipment, and every effort made to construct roads which can safely withstand the traffic of present-day vehicles, standards of which are today fairly well established.

"Obviously, after an exhaustive study of these important items the most economic selection will be that which facilitates the application of the truck to the greatest degree, but at the same time represents the lowest cost to the state when considered over a period of years.

"The third problem and no doubt the most important upon which the future of the Automotive Industry depends is the fuel problem. Many comprehensive papers and talks on this subject have been presented on former occasions but the problem has now developed to the point where a substitute for our present fuels or radical steps toward its conservation must be instituted.

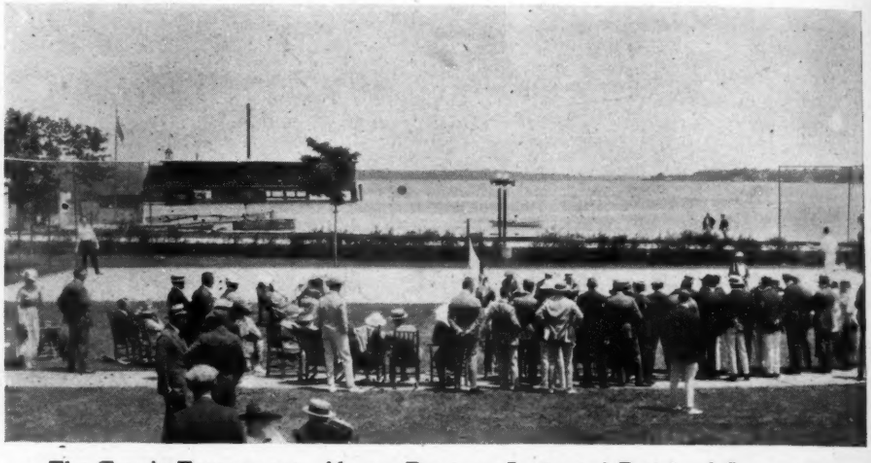
"Aside from the possibility that new oil fields will be opened, the immediate future seems to point to fuel conservation measures as one of the most available expedients."

In concluding his address Col. Vincent called attention to the necessity of developing commercial airplanes, and of placing the aircraft branch of the Automotive Industry on a sound transportation basis.

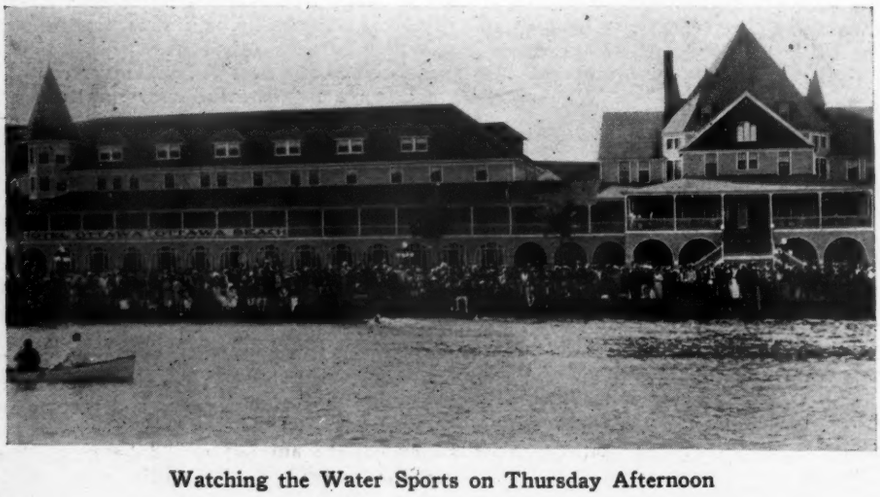
After his address the reports of the various committees were read. The metric system was then brought up for discussion but the subject was dismissed by practically unanimous vote; the society going on record as being against the compulsory adoption of the system by Congress. The secretary of the society was instructed to inform both Houses at Washington of the action taken by the society.

Fuel Session, Tuesday Morning

This session was probably the most interesting and best attended of all business sessions. The report of the Automotive Fuel Committee was delivered by H. L. Horning, chairman of the committee. The hot spot and heated manifolds were agreed upon as being the most important factor in solving the fuel problem of today. Experiments made by different members of the committee showed that manifold design plays an important part in the utilization of modern fuels and that by properly utilizing heat in connection with the intake pipe the satisfactory use of the present low grade fuels is possible. The practice of heating the upper part of a tee manifold was pointed out to be somewhat unsatisfactory in comparison with heating the curves at the lower part of the manifold and which assertion produced quite a great deal of discussion. It was shown that by the former method of heating a great deal of the heavier gases in the form of unvaporized fuel would be drawn into the intake pipe and be impinged against the hot surface whereas the lighter gases would travel into the engine without coming into direct contact with the heated surface. It was pointed out that only at exceptionally high speeds would the tee manifold when heated at the top, function properly, whereas at lower speeds the heavier particles of fuel would follow along the lower sides of the bends at the junction between the vertical and horizontal branches of the intake pipe, thus indicating that more heat is needed at these points that opposite the top of the vertical branch.



The Tennis Tournaments Always Drew an Interested Bunch of Spectators



Watching the Water Sports on Thursday Afternoon

Mr. Horning made quite a hit with the audience when he asserted that the fuel problem was more or less directly up to Henry Ford because of the number of cars, which he is turning out, many of which are not obtaining more than eleven miles per gallon. He said that if Ford would take the recommendations of the fuel committee he would advance the anti-climax in the fuel situation for a number of years.

Manifold design was given quite a good deal of consideration and it was stated that with new designs of manifold constructed according to the recommendations made by the fuel committee, it would be possible to readjust the carburetor to give a leaner mixture with a consequent saving in fuel as well as a more satisfactory general operation.

Turbulence is agreed upon as being very important in properly vaporizing low grades of fuel, and that it is absolutely necessary for economy and power that the mixture be as turbulent as possible to promote flame propagation. It is stated that turbulence, which is promoted by the proper gas velocity past the intake valves is preferable to complicated intake design, excessive heating of the intake pipe, etc.

During this session O. H. Ensign brought out some interesting points on carburetion and the distribution of low grade fuel, which address was supplemented by lantern slides. C. A. Norman, professor of the Ohio State University, contended that we did not have the best type of power engine and believes that the steam engine will some day become a factor in automotive power plants.

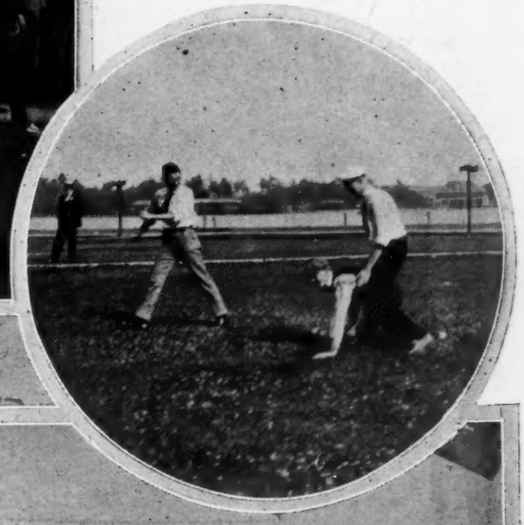
Another interesting address delivered during this session, and which by the way brought forth a lot of questions, some of which were very pertinent, was that made by R. L. Welch, general secretary of the American Petroleum Institute. Mr. Welch stated that the yearly deficit of the United States in the production of crude oil was about 50,000 bbl. He strongly urged the members to do all in their power to help conserve fuel and that if the automotive industry co-operates there should be no need for alarm. He quoted some government figures, which proved conclusively that we are consuming more oil than we are at the present time producing. Mr. Welch stated that there was no use of designing engines for the purpose of burning kerosene as there is a tremendous demand at the present time for kerosene and that sooner or later the oil industry will be cracking practically all the kerosene and gas oil to procure gasoline from them. Mr. Welch recommended that the industry use the present day gasoline as is.

H. M. Crane, who presided at this session, asked Mr. Welch whether the petroleum industry can regulate the blending of kerosene and casing head gas. Mr. Welch replied that this abuse is not very prevalent and that where the states have tried to curb this practice it has worked out to the disadvantage of the public.

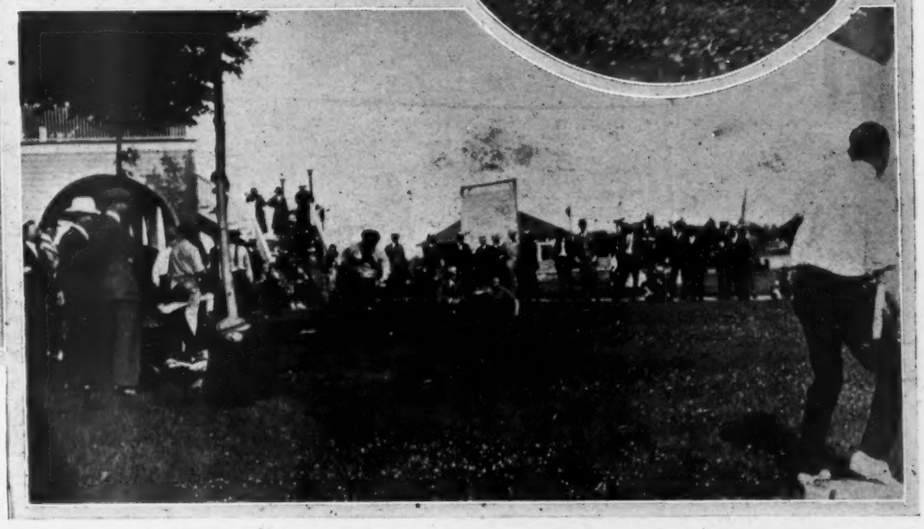
Someone asked whether the high price of gasoline was due to manipulation by the oil interests. Mr. Welch answered this question very decidedly by stating that over 51 per cent. of the output in 1919 was produced by the independent refiners and the rest by Standard Oil. In conclusion he stated that the cracking process is on the increase, and that about 23 per cent. of the 1919 supply of crude oil was turned into gasoline.

Every statement made by the various speakers during this session pointed to the fact that only by strict economy and the elimination of waste will we be able to conserve our fuel supply.

The Ladies Took a Great Interest in the Baseball Games



The Fish Were Not Big, But There Were Plenty of Them

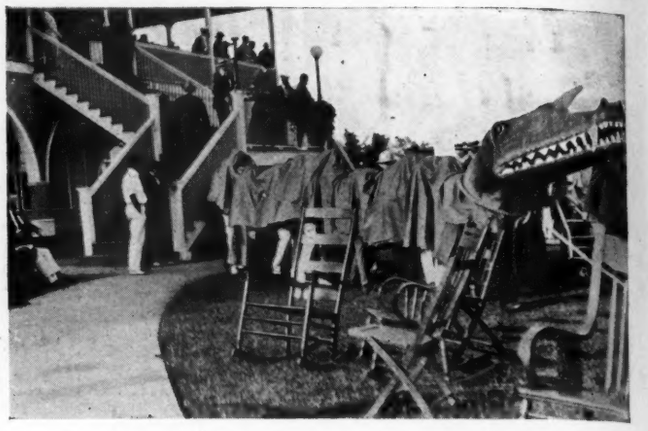


Wednesday, Transportation Session

Wednesday morning was given over to papers on transportation, which session also was attended by a large number. Vincent presided at this session and introduced as one of the first speakers, G. A. Green, of the Fifth Avenue Coach Co., of which Mr. Green is general manager and engineer. Mr. Green did not read his paper, but reviewed the contents of his paper briefly. He stated that the Research Department of his company was responsible for saving twenty per cent or $100,000 a year in fuel consumption.

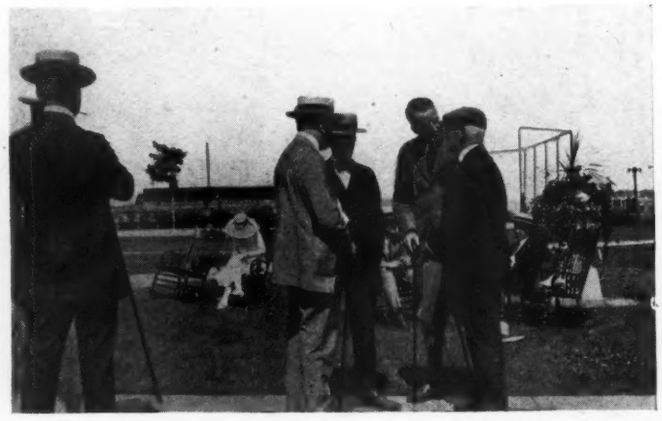
Although the general impression prevails that the average motor truck chassis can be successfully employed for motor bus operation, the Fifth Avenue Coach Co. does not hold this view. This company builds its own buses, which at the end of two thousand miles of running are thoroughly overhauled and where necessary replacements are made with new parts. Where improvements are tested and show definite merit it is the duty of the Research Department to make recommendations in regard to the embodying of these improvements and their equipment. Mr. Green also touched on the labor subject. It is interesting to know that all of the drivers entering the employ of this company must qualify in oral, blackboard and written examinations and after being accepted are given a thorough and practical working knowledge in a special school conducted by this company. Mr. Green stated that from the time a man files his application as a conductor to the time he is made a driver the company spends practically $200 for his education. Mr. Green deprecated the establishment of jitney buses, either municipal or privately owned because he believes that any such public service company should be capable of assuming proper responsibility. This company's estimate for fixed charges is 15c per mile, including overhead, labor, wages, etc., while the fuel charge is about 6c per mile. Mr. Green believes it impossible to run a bus line and make money on anything less than a 10c fare. It is stated that from 40 to 50 per cent. is the average load carried, which makes it necessary to charge a higher rate in order to make up the deficit.

In the absence of Col. B. F. Miller, Coker Clarkson read the Motor Transport Corps' paper on the "Relation of the Motor Transportation Corps to Commercial Transportation." In this paper the importance of motor transport was indicated, and it was urged that every effort should be made to have the motor transport corps continue its operations. The chief of the corps recommended that government designed trucks be adopted as standard for the army, and that the truck manufacturers should design their product so as to be of service during war times without requiring much changing.



The Pennsylvania Section's Dragon Experienced Some Difficulty in Navigating Among the Chairs on the Lawn

tonnage which will be carried upon them in the future. He stated that the road engineers were on the job, but that they are handicapped by the fact that in most cases no funds are available for the purpose of making tests and studying the sub-base conditions. He further stated that too many roads are being built regardless of the road base and that the same thickness of road is being placed on various kinds of soil. He believes that to do justice to our road program we should build at least 40,000 miles of roads each year for the next ten years.



All the Men Carried a Hyatt Cane

Advocates Study of Road Bed

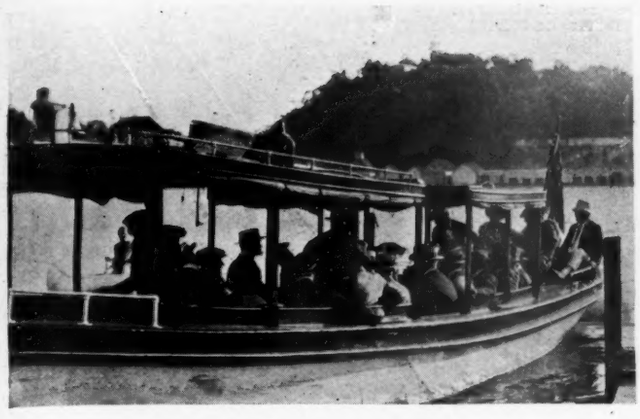
H. D. Shirley gave a very interesting account of what the Federal Highway Council was doing in its study of sub-base and soil conditions. Mr. Shirley pointed out that fifteen years ago four tons was considered a maximum load for the best road. He laid particular emphasis on the fact that until the sub-base is studied thoroughly by road engineers, no roads can be guaranteed to withstand the

Discussions Were Not Limited to the Business Sessions

Farm Power Session, Thursday Morning

At this session, E. A. Johnson, chairman of the Tractor Division, presided. O. B. Zimmerman made the first address at this session, entitled "An Analysis of Fundamental Factors Affecting Tractor Design." Mr. Zimmerman favored lower speeds in relation to speed and design. He stated that the real question was whether one can plow more ground per horsepower with a low speed or a high speed tractor. This address was supplemented with lantern slides.

Professor E. A. White, who was next on the program, taking the place of Percival White, who was unable to attend, contended that high speed plowing is to be preferred. He appealed to the members to be more interested in power farming and that plowing alone should not be the chief concern of the engineer, but that cultivating, harvesting, soil preparation and seeding must all be taken into consideration when designing tractors. He particularly emphasized the fact that the engineer should not fall into the error



The Good Ship "Silvertown" With a Merry Crew on Board.

of drawing conclusions without sufficient data. He claimed that most plows were designed for horse-drawn implements and is convinced that higher speeds will be available if plows are designed for tractors. In his observations he has found that the four-plow tractor is the one most favored by the average farmer, and that the farmer is afraid of additional weight when considering larger sizes. He therefore believes that if the four-plow tractor is the limit in choice that increased speed is necessary. He believes that ultimate efficiency of power farming is at stake unless definite information is obtained.

Emmons held the chair during this session. A. G. Drefs spoke on "Production Control and Systems of Accounting." "The Workman, an Element of Production," was the subject handled by A. F. Knobloch, while Magnus W. Alexander spoke on "Some Important Phases of the Industrial Situation." R. R. Potter closed the session with his address on "Interdepartmental Production Contests."

Ordnance Exhibitions

An interesting demonstration of Army tractors and motorized gun mounts was given by the United States Army Ordnance Department at Jenison Park. The demonstration consisted chiefly of maneuvers, which showed the ease with which the tractors and gun mounts could negotiate bad ground. One of the spectacular features on the program was a tug of war between a small experimental tractor and a gun mount. Members attending this demonstration were conveyed to the park by means of the Goodyear company's six-wheel pneumatic motor truck, details of which appeared in the past number of this journal.

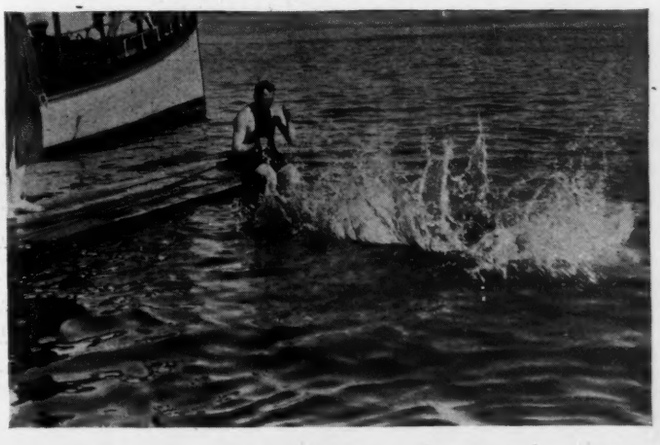
Come on in, Boys, the Water's Fine.

An interesting lecture was also given during this session by R. W. Lohman, a well known expert on large scale farming. This lecture was illustrated with lantern slides. The application of tractors to all kinds of agricultural equipment, running into apparatus of several hundred horsepower, was shown. Methods of digging ditches and drains a number of feet underground in a heavy clay soil in which four 75 hp. tractors were used in tandems created a great deal of interest. Another interesting machine shown was that of a field thresher in which grain was threshed on the fields and made ready for delivery to the railroad simultaneously with the reaping.

On Thursday evening a lecture was given by W. D. Shilts, chairman of the Board of Control, Goodyear Tire & Rubber Co., on "The Economies of Present Day Transportation Problems." This lecture was followed by the grand ball, dancing contests and supper, after which the prizes were awarded to winners in the sports contests. The Friday morning session was given over to more important items of production. Harold

Baseball, tennis, aquatics, golfing, trap shooting, cards, and last but not least, African golf, were indulged in to the fullest extent by the members. Much credit is due to Harry Knepper, of Detroit, and his able corps of assistants in making the sports program one of the features of this meeting. Quite a number of stunts were pulled off by the various sections. The Metropolitan Section displayed a tank on the lawn of the hotel, which could do everything but the "shimmy." Its exhaust was exceptionally smoky. The Pennsylvania Section brought forth a dragon, which although ferocious looking was perfectly harmless. The head of this dragon, designed and built by A. K. Brumbaugh, was indeed a masterpiece. The Midwest Section rendered as its offering a two-bout prize fight. The first was of a comical nature, while the second consisted of a lively scrap between two professionals. Moving pictures on the lawn were a nightly feature. The field events which consisted of races, tugs-of-war, high jumps, etc., were run off without the usual delays, so that the audience was kept interested every minute.

During the week many souvenirs were distributed. Wednesday morning at seven o'clock many of the members were aroused from a sound sleep by the ringing of bells in the corridors of every S. A. E. hotel. First the surprised member rushed to answer the telephone, but to his surprise there was no telephone in the room. Next he muffled the call bell but the noise continued. But after the drowsy individual opened his door, he at last discovered the reason for the racket. On each door of the hotels there was attached a miniature alarm clock, distributed by the Klaxon company. The Hyatt Roller Bearing Co. distributed canes for the men and parasols for the ladies. Toy balloons, hot water bottles for the ladies, miniature tires and rubber boots were generously distributed by the Goodrich Co. This company also provided pleasure for many during the week with their good ship "Silvertown." This yacht took many parties about the lake for a pleasant cruise. The five o'clock trip down the lake to the Waukazoo Inn was heartily approved of by many of the members who had the opportunity to crowd on the boat. The well trained band of the Continental Motors Co, of



This Wasn't a T. N. T. Bomb, But Simply a Member Starting Out on a Race.

Muskegon, furnished music in the afternoon and evening, and its efforts were well applauded.

Nomination of 1921 Officers

David Beecroft, Directing Editor of the Class Journal Co., was nominated to serve as president of the society for the next calendar year by the Nominating Committee, which was completed and organized at this meeting. The committee reported the following other consenting nominees for the elective offices next falling vacant under the Constitution, i. e., after the 1921 annual meeting of the society:

First Vice-Pres., H. L. Horning
Second Vice-Pres., representing Motor-Car Engineering, B. B. Bachman
Second Vice-Pres., representing Tractor Engineering, E. A. Johnson
Second Vice-Pres., representing Aeronautic Engineering, H. M. Crane
Second Vice-Pres., representing Marine Engineering, Joseph Van Blerck
Second Vice-Pres., representing Stationary Internal Combustion Engineering, T. C. Menges
Councilors (to serve during 1921 and 1922), W. A. Brush, F. W. Davis and D. L. Gallup
Treasurer, C. B. Whittelsey

The members of the 1920 Council who will hold over during 1921 are: J. G. Vincent, as past-president, and Councillors E. A. De Waters, F. M. Germane and N. B. Pope.

The 1920 nominating committee was constituted of N. B. Pope (chairman), Metropolitan Section; H. R. Corse, Buffalo Section; Earnest Wooler, Cleveland Section; L. R. Smith, Indiana Section; B. B. Ayers, Midwest Section; A. W. Scarratt, Minneapolis Section; A. K. Brumbaugh, Pennsylvania Section; V. G. Apple, G. P. Dorris and C. F. Scott, members at large, and W. B. Stout (secretary), Detroit Section.

Constitutional Amendments

The amendments to the Constitution of the Society submitted at its New York meeting in January were considered at Ottawa Beach, with the result that no changes were favored in the present Constitution except in the matter of the age under which persons can be admitted as Junior Members and the amount of junior membership annual dues. It was felt that the age mentioned should be raised from 26 to 30 and that the annual dues for Juniors should be $10. A letter ballot will accordingly be taken of the voting members of the Society on the adoption of the amendments to the Constitution indicated.

Treasurer's Report

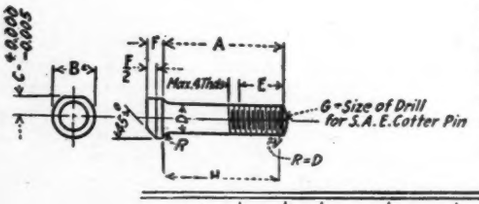
The report of the treasurer showed that the total assets of the Society were $202,844.19 on June 1, with accounts payable of $15.989.33; that the income of the Society for the first eight months of the current fiscal year beginning October 1, 1919, was $168,859.23, this being $25,848.91 in excess of expenses for the same period.

Standards Submitted for Adoption

The Following Standards Are Proposed by the Various Divisions of the Standards Committee for Adoption by the Society as S. A. E. Standards. Only Those Standards That Have a Direct Bearing on the Commercial Car End of the Industry Are Herewith Listed. While They Have Been Approved Substantially in the Form Given Here, by the Standards Committee, by the Council and by the Society, at the Semi-Annual Business Meeting, They Cannot be Considered as Finally Adopted Until Approved by a Letter Ballot to All the Voting Membership, Which Will Take From Thirty to Sixty Days.

Connecting-Rod Bolts

Data obtained from approximately 60 companies representing the passenger car, commercial vehicle, stationary engine, tractor and marine industries show that there are about 75 different sizes of connecting-rod bolts used at the present time. The Division found, however, that about 75 per cent. of these were similar in head design and these types were, therefore, used as a basis for the new standard. The thread tolerances are in agreement with the tentative report of the National Screw Thread Commission and the body diameter limits provide a reasonable driving fit of the bolts in reamed holes.



Diam.	A	B	C	D	Thds. S.A.E.	Pitch Diam.	E[1]	F	G No.	H	R
7/16	Lengths Vary by Even 1/8 Inches, Preferably by 1/4 Inches.	7/16	7/32	0.3125 / 0.3105	24	0.2854 / 0.2830	1/2	7/32	48	A-7/32	0.01 to 7/64
3/8		5/16	7/32	0.3750 / 0.3730	24	0.3479 / 0.3455	5/16	7/32	36	A-7/32	
7/16		11/32	1/4	0.4375 / 0.4355	20	0.4050 / 0.4024	11/32	1/4	36	A-1/4	
1/2		3/4	9/32	0.5000 / 0.4975	20	0.4675 / 0.4649	3/4	9/32	36	A-9/32	7/64 to 9/64
9/16		3/8	5/16	0.5625 / 0.5600	18	0.5264 / 0.5234	7/8	5/16	28	A-5/16	
5/8		1	3/8	0.6250 / 0.6220	18	0.5889 / 0.5859	1	3/8	28	A-5/16	
3/4		1 1/16	7/16	0.7500 / 0.7470	16	0.7094 / 0.7062	1 1/16	7/16	28	A-5/16	9/64 to 5/16
7/8		1 3/16	1/2	0.8750 / 0.8715	14	0.8286 / 0.8250	1 1/4	1/2	28	A-5/16	
1		1 1/2	7/16	1.0000 / 0.9965	14	0.9536 / 0.9500	1 1/2	5/8	28	A-5/16	

Threads are U. S. Form
[1]Minimum Length of Usable Threads.
Recommended practice for material is S.A.E. steel Spec. No. 2330 or 3130. Heat treatment should give a Brinnel test of from 223 to 285.

The Engine Division believes that this standard will be of particular value to manufacturers of screw-machine products, who are at present called upon to produce an unnecessarily large number of connecting-rod bolt types and sizes.

Eye Bushings and Bolt Tolerances

As the present S. A. E. Recommended Practice for Eye Bushings and Bolt Tolerances, page 49d, S. A. E. Handbook, Vol. 1, does not specify the thickness of the bushing wall, the recommended practice is extended to specify that the nominal wall thickness of spring-eye bushings shall be 1/8 in. for all sizes of springs. This change is based on the fact that the 1/8 in. wall thickness is widely used, and it is considered that bushings of less than 1/8 in. thickness would be unsatisfactory because of difficulties which would be experienced in pressing them in.

Felloe-Band Tolerance

Owing to the variations in the thickness of commercial tapes, with the resulting inaccuracy of wheel measurements, it is recommended that approved standard tapes be used for measuring felloe-band circumferences, of which one set is intended for truck and one for passenger car wheels. These tapes have been approved by the Automotive Metal Wheel Association and the Automotive Wood Wheel Manufacturers' Association and may be obtained from the Tire and Rim Association.

S. A. S. Standard for Allowable Tolerances in Felloe Bands, page 8a, S. A. E. Handbook Vol. 1, is therefore extended to include the following note:

It is recommended that all measurements of truck and passenger car wheel circumferences be made with approved standard wheel tapes furnished by the Tire and Rim Association.

Deflection and Set Test of Automobile Pneumatic Tire Rims

The present S. A. E. Standard for Deflection and Set Test of Automobile Pneumatic Tire Rims, page 8f, S. A. E. Handbook, Vol. 1, specifies the pressure, deflection and permanent set for 3½, 4, 4½, 6 and 7-in. rims only. The present S. A. E. standard extended to include the pressure, deflection and permanent set for the 5, 8 and 10-in. rims is as follows:

The deflection should be measured from a fixed inflation load of 25 lb. per sq. in. for 3½, 4 and 4½-in. sections, and 50 lb. per sq. in. for 5-in. and large sections up to the maximum pressures given.

PNEUMATIC TIRE RIM TESTS

Rim Size Nominal, In.	Maximum Pressure, Lb. Per Sq. In.	Maximum Deflection, In.	Total Permanent Set, In.
3½	140	0.06	0.02
4	160	0.07	0.03
4½	180	0.10	0.06
5	190	0.12	0.06
6	200	0.15	0.06
7	225	0.15	0.06
8	250	0.15	0.06
10	250	0.15	0.06

Pneumatic Tires for Passenger Cars and Commercial Vehicles

The present S. A. E. Standard for Pneumatic Tires and Rims for Passenger Cars and Commercial Vehicles, page 8g, S. A. E. Handbook, Vol. 1, is revised so as to eliminate the 42 x 9 in. tire and rim as regular equipment and to include the 44 x 10 in. tire and rim as regular equipment.

The present S. A. E. Standard so revised is given in the following table:

Nominal Tire and Rim Sizes		Oversize Tire		Tire-Seat Dia. (Rim)		Type of Rim
Inches	Mm.	Inches	Mm.	Inches	Mm.	
30x3½	90/585	31x4	105/585	23	585	Clincher
32x3½	90/635	33x4	105/635	25	635	Straight Side
32x4	105/610	33x4½	120/610	24	610	Straight Side
33x4	105/635	34x4½	120/635	25	635	Straight Side
33x4½	120/610	34x5	135/610	24	610	Straight Side
32x4½	120/585	33x5	135/585	23	585	Straight Side
34x4½	120/635	35x5	135/635	25	635	Straight Side
34x5	135/610	36x6	150/610	24	610	Straight Side
36x6	150/610	38x7	175/610	24	610	Straight Side
38x7	175/610	40x8	200/610	24	610	Straight Side
40x8	200/610	42x9	225/610	24	610	Straight Side
44x10	250/610	....	....	24	610	Straight Side

S. A. E. Standard Carrying Capacity of Solid Tires

The present S. A. E. Standard for Carrying Capacity of Solid Tires, page 8bb, S. A. E. Handbook, Vol. 1, has been criticized by certain truck manufacturers to the effect that at rated truck capacity an increase in the tire carrying capacities would be justified in practically all sizes and would conform to general practice.

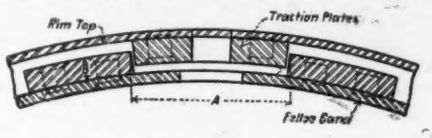
The carrying capacities specified in the present S. A. E. Standard for Carrying Capacities of Solid Tires are therefore revised to conform to capacities given in the accompanying table. As a matter of information the present carrying capacities are given in parentheses for the capacities it is proposed to increase.

CARRYING CAPACITY OF SOLID TIRES

Solid Tire Width, In.	36-in. Diameter or Less	40-in. Diameter
3	1000	....
3½	1300	....
4	1700	....
5	2500	3000 (2800)
6	3500 (3300)	4000 (3500)
7	4500 (4200)	5000 (4500)
8	5500 (5200)	6000 (5800)
10	7500 (7000)	8000 (7500)
12	....	10000 (9500)
14	....	12000 (11500)

Pneumatic Tire Felloe Bands

An agreement has been reached among wheel manufacturers for the dimensions of the 5, 6, 7, 8 and 10-in. pneumatic truck tire felloe bands, which are given in the accompanying tables. This proposal has been accepted by the Tire and Rim Association and is now adopted as S. A. E. standard.

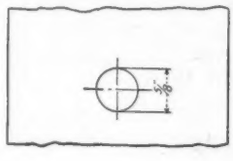


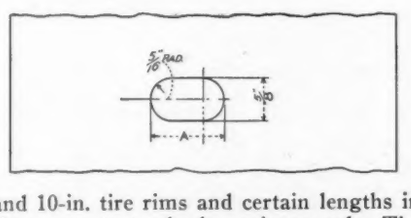
Drive-Plate Dimensions

Rim Size	A +0.004 −0.000	B	Width of Drive Plates
5	2½	5/16	1⅜
6	2½	5/16	2
7	2½	5/16	2⅛
8	2½	5/16	2⅝
10	3	5/16	3¼

Automobile Rim Valve Holes

The present S. A. E. Standard for automobile rim valve holes, page 8xf, S. A. E. Handbook, Vol. 1, is extended to include the dimensions for the 5, 8, and 10-in. tire rims and certain lengths in the present standard are increased. The present S. A. E. Standard as revised and extended is given in the accompanying table.





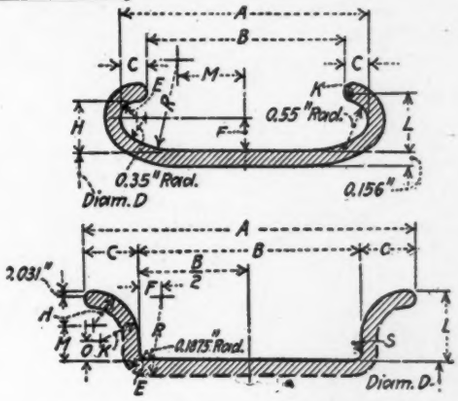
Rim Size	3½	4	4½	5	6	7	8	10
A (Min.)	5/8	5/8	5/8	1 3/16	2 1/8	2 5/8	3 1/4	4 1/8

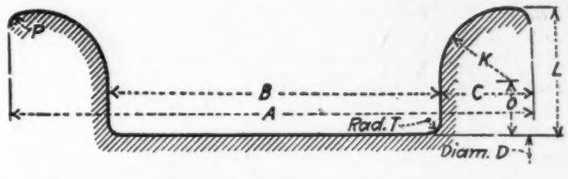
Rim Sections and Contours for Pneumatic Tires

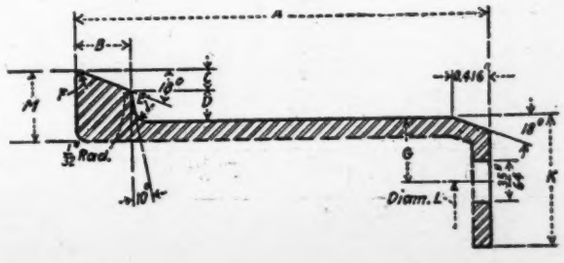
The present S. A. E. Standard for Rim Sections and Contours for Pneumatic Tires and Passenger Cars and Commercial Vehicles, page 8ha, S. A. E. Handbook, Vol. 1, is revised in accordance with the dimensions submitted in the accompanying table. This table has been extended to include the dimensions submitted in the accompanying table. This table has been extended to include the dimensions for the 5-in rim recently adopted and for the 10-in rim which is recommended for adoption. The radius of the fillet for the 3½, 4 and 4½-in.

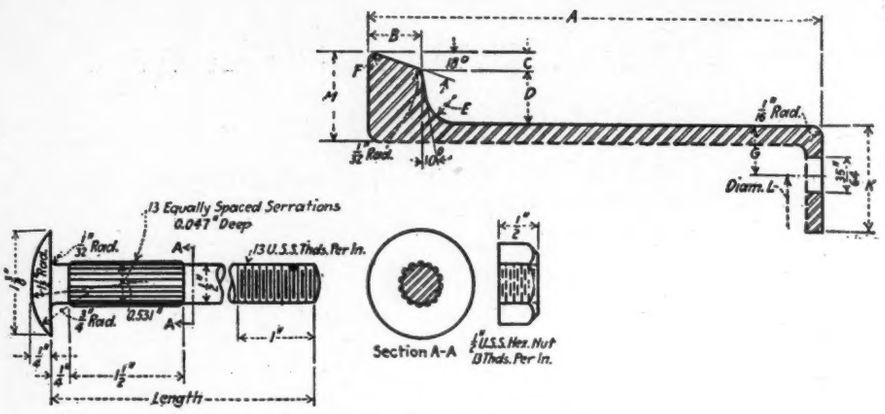
Straight-side rims have been increased from 3-32 to 3-16-in. owing to trouble which has been experienced with rims cracking at this point. Tolerances have also been placed upon the height of the 3½-in. rim.

These revisions have been adopted by the Tire and Rim Association and are in accordance with present practice.









PNEUMATIC TIRE FELLOE-BAND DIMENSIONS

Fig. No.	Rim Size	A	B	C	D	E	F	G	K	M	L Bolt Circle Diameter	Bolts (Fig. 3) Number	Bolts (Fig. 3) Length
1	5	2 11/16	11/16	0.153	1/4	1/2	1/4	0.656	1 3/16	0.558	21.375	8	3 3/4
1	6	3 1/16	11/16	0.183	11/16	1/2	1/4	0.750	1 3/16	0.636	21.125	10	4 1/2
1	7	4 1/16	11/16	0.183	11/16	1/2	1/4	0.750	1 3/16	0.636	21.125	10	5 1/2
1	8	4 1/16	11/16	0.183	11/16	1/2	1/4	0.625	1 3/16	0.729	21.125	10	5 1/2
2	10	5 1/16	5/8	0.203	0.620	3/8	1/4	0.5625	1 1/4	1.042	20.625	10	6 1/2

PNEUMATIC TIRE RIM SECTIONS AND CONTOURS

Fig. No.	Nominal Tire and Rim Size	Rim Diam. (Tire Seat)	Rim Circum. (Tire Seat) ±0.046	A	B Nom.	B Tol.	C	R	E	F	H	K	L Nom.	L Tol.	M	O	P	S	T
1	30x3½	23	72.257	2.600	2.050	±0.046	0.275[A]	0.910	0.1400	0.3400	0.50	0.0780	0.5780	±0.008	0.680	.....	.....	....	.....
	32x3½	25	78.540	3.432	2.312	±0.046	0.560	0.840	0.1875	0.2500	0.32	0.5100	0.6370	+0.012 −0.0075	0.367	0.1990	.....	0.625	.....
2	32x4	24	75.398	3.888	2.688	±0.046	0.600	0.840	0.1875	0.2500	0.34	0.5600	0.7800		0.440	0.2450	.....	0.625	.....
	33x4	25	78.540																
	34x4	26	81.681																
	32x4½	22	72.257																
2	33x4½	24	75.398	4.380	3.120	±0.046	0.630	0.840	0.1875	0.3125	0.38	0.6150	0.8750		0.495	0.3030	.....	0.625	.....
	34x4½	25	78.540																
	34x5	24	75.398	5.310	3.750	±0.047	0.780	.....	.....	.....	.....	0.6250	1.0625	±0.024	....	0.4375	0.0940	....	0.2500
	36x6	24	75.398	6.330	4.330	±0.047	1.00	.....	.....	.....	.....	0.7187	1.2656	±0.024	....	0.5469	0.1400	....	0.2500
3	38x7	24	75.398	7.000	5.00	±0.047	1.00	.....	.....	.....	.....	0.7187	1.2656	±0.024	....	0.5469	0.1400	....	0.2500
	40x8	24	75.398	8.500	6.00	±0.063	1.25	.....	.....	.....	.....	0.8750	1.5000	±0.031	....	0.6250	0.1500	....	0.3125
	44x10	24	75.398	10.330	7.33	±0.063	1.50	.....	.....	.....	.....	1.2500	2.0000	±0.031	....	0.7500	0.1875	....	0.3125

All dimensions are in inches.
[A] Tolerances of +0.016, −0.008 in. apply to this dimension.

Oil and Grease Cup Threads

The following oil and grease-cup thread sizes, which are widely used in present practice, have been adopted.

S. A. E. Fine Thread		American Standard Taper Pipe Thread	
Diameter	Threads per Inch	Diameter	Threads per Inch
1/4	36	1/8	27
5/16	32	1/4	18
		3/8	18
		1/2	14

Brake Lining

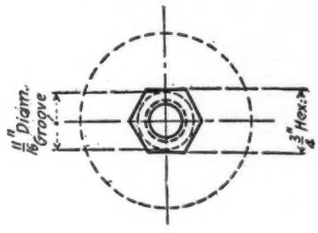
The sizes given in the present S. A. E. Standard for Brake Lining, page 26c, S. A. E. Handbook, Vol. 1, are revised to conform to the sizes given in the accompanying table. This eliminates the following sizes specified in the present S. A. E. Standard: 1/8 by 1, 1/8 by 1¼, 1/8 by 1½, 3-16 by 1, 3-16 by 1¼, ¼ by 1, ¼ by 1¼, ¼ by 1½, 5-16 by 1, 5-16 by 1½, 5-16 by 2, 3/8 by 2, 3/8 by 2¼, 3/8 by 2½. The following sizes are widely used in present practice: 5-32 by 1, 5-32 by 1⅛, 5-32 by 1¼, 5-32 by 1½, 5-32 by 1¾, 5-32 by 2, 5-32 by 2¼. The 5-32 by 1⅛-in. size has been included in the new standard, as it will probably be widely used by motorcycle manufacturers.

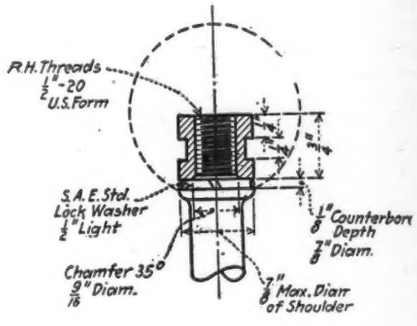
BRAKE LINING WIDTHS AND THICKNESSES

Width In.	Thickness, In. 1/8	5/32	1/4	5/16	3/8
1	•				
1⅛	•				
1¼	•				
1⅜	•	•			
1½	•	•	•		
2	•	•	•		
2¼	•	•	•	•	
2½		•	•	•	
2¾			•	•	•
3			•	•	•
3½				•	•
4				•	•
4½					•
Tolerances, In.	+0.000 −0.020	+0.000 −0.020	+0.000 − 1/32	+0.000 − 1/32	+0.000 − 1/32

(Continued)

changeability on control-levers. In order to secure interchangeability of the ball-handles on control-levers of different makes and to lessen the cost of production, the following standard is adopted. This will permit the use of one size of stock, cheaper and uniform screw-machine tooling and set up, and uniformity in ball-





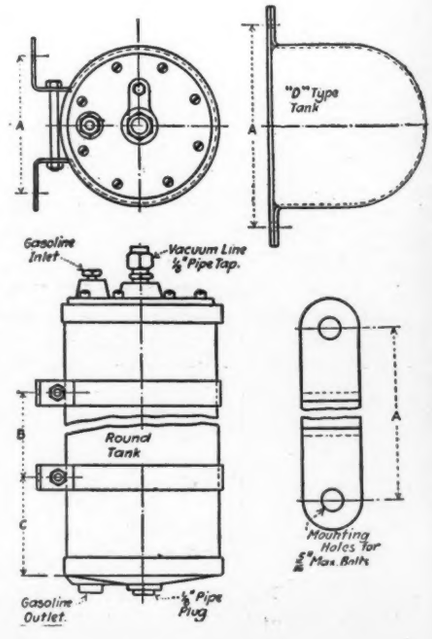
moulding dies. As strength is not the important factor, the proposal is considered suitable for use in the several types of automotive vehicles.

Control-Lever Ball-Handle Inserts

Data on control-lever ball-handle inserts show a considerable variation in bar stock sizes, thread pitches and diameters and non-essential details which do not permit of inter-

Fuel Vacuum Tank Mounting

The present S. A. E. Recommended Practice for Fuel Vacuum Tank Mounting and Connections, page 35da, S. A. E. Handbook, Vol. 1, is revised so as to permit the use of 5-16 in. bolts. This revision will permit the use of smaller bolts if desired and is in accordance with present practice.



Cleveland Dealers Take Action in Fighting Anti-Motor Truck Propaganda

Misleading Newspaper Statements Cause Considerable Damage to Motor Truck Interests in Cleveland Territory. Dealers Ask Other Organizations to Join in Combating Adverse Criticism

By C. P. SHATTUCK

A CONCRETE example of the value of a dealer organization is had in case of Cleveland, O. Under the heading "Roads Crumble Under Heavy Truck Traffic," appeared a front page article in the leading newspaper, in which trucks were held responsible for all damage to the highways leading out of Cleveland, and particularly between Cleveland and Akron. To use a newspaper expression the paper "played up" the story which contained interviews with the county engineer, the sheriff and with the secretary of the automobile club.

The county engineer is credited with the following statement: "No road will stand for a 25-ton load being driven over it at from 20 to 40 miles an hour, and I have seen just such loads on the Twinsburg Road. That road was in perfect condition March 1. Now it is a ruin. We have the spectacle of private lines of freight carriers using roads maintained at public expense in their competition with the railroads and other carriers. This is an injustice. The public cannot afford to build the heavy special roads needed by truck traffic. The present roads cost about $80,000 (?) a mile to build, and must be saved for public travel."

Stirs Up a Hornet's Nest

As can be easily imagined the truck dealers were exceedingly peeved, and it is said that the telephone wires communicating with each other as well as to the newspaper were kept hot the day the article appeared. To use the vernacular, the official who is credited with being responsible for the article "started something." Members of the Cleveland Commercial Car Dealers' Association demanded action, insisted on reprisals, but despite the fact that attack upon trucks merited some comeback, cooler heads prevailed.

The writer, who was in Cleveland at the time, attended the meeting of the Board of Directors of the association at which the article and reprisal plans were discussed. There is no gainsaying the fact that the directors were considerably wrought up over the attack on their business, particularly the singling out of the truck as the cause for road deterioration.

After much deliberation is was decided to start a campaign to counteract the effect of the newspaper article and to bring pressure to bear upon the organizations of which the official said to have given out interviews to the press is connected. Consequently a letter was prepared and sent to the Cleveland Automobile Club's directors and another to the directors of the Cleveland Automobile Manufacturers' and Dealers' Association.

The letter to the automobile club was as follows:

To the Cleveland Automobile Club,
Gentlemen:—

"On June —— there appeared in the ———— an article entitled "Roads Crumble Under Heavy Truck Traffic," in which an interview with your Mr. —— was made very prominent.

"We assume Mr. —— was correctly quoted. The Cleveland Commercial Car Dealers' Association wishes to register emphatic protest against the language used, the prejudice and unfairness displayed by Mr. ——.

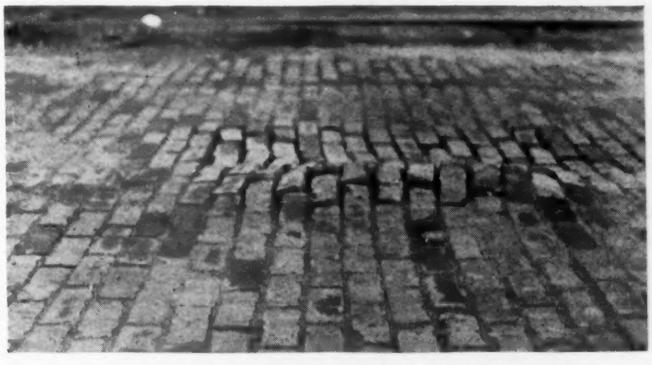
"We and our friends are members of the Cleveland Automobile Club and we feel that Mr. —— has been engaged to look after the interests of the entire industry, which is almost as big and just as important as the passenger car business.

"Every member of the Cleveland Commercial Car Dealers' Association is fighting for good roads and against overloading and overspeeding of both light and heavy trucks. Every member is willing to concede the trucks' share of the blame for the present condition of our roads, but we ask your organization likewise to appreciate the fact that passenger cars injure the roads also, and that certain roads are unscientifically constructed.

"We submit that you do the cause of good roads positive damage and the Truck Industry very great injury by such inflammatory statements as made by Mr. —— which tend to cause popular prejudice against the use of heavy duty trucks. Such interviews take public opinion away from the real cause of the trouble which is primarily due to poor construction, poor material and lack of drainage.

"Mr. ——'s biased interview would lead the public (a large part of whom because of misinformation are already prejudiced against the motor truck) to believe that heavy duty motor trucks particularly are solely to blame for the destruction of the roads. Such articles would inevitably result in vicious legislation as has been threatened for the past few years at Columbus and already put in force in some states whereby the 3½-ton and 5-ton trucks have been legislated off the highways and truck transportation costs in those states nearly doubled in heavy tonnage work.

"In other words, you divert public opinion from the question of improving road conditions and raise a popular and unjustified clamor against the use of heavy duty motor trucks. To make LARGE statements to the effect that truck drivers were arrested near Cleveland whose trucks with loads weighed from 25 to 27 tons and



A Sample of the Brick Road on Euclid Avenue

Statement is made that this and other holes have appeared before the repair gangs move out of sight. Photo was taken within a few hundred yards of where repairs were being made

One of the Craters in Road on Which Trucks Are Practically Excluded and Where Passenger Cars Are Permitted

Another Example of High-Priced Roads Referred to in Newspaper Attack

at times were found driving at 40 miles an hour, shows the utter lack of knowledge on the part of the man making the statement whether he be an official of your culb or an official of the county.

"In a nut-shell, we want greater co-operation between your organization and ours. Let us all try to improve conditions and not one blame the other. Only by working together can we really improve our roads. Let us concentrate public opinion upon the fact that we should no longer build our roads like we did ten years ago. New traffic conditions compel us to build modern roads. Let us work together to stop excessive speeding whether it is the joy rider, the light express or the heavy duty truck. We should recognize that an overloaded light truck or a heavy passenger car driven at high speed cannot be driven fast unless it is coasting down hill.

"When the complete situation is considered without bias and prejudice and we work together with a spirit of harmony, we will be able to quickly change public sentiment. We can change the acts of our road building authorities so that roads are properly constructed and properly maintained and our present road laws enforced whether those who break them use horses, touring cars or trucks."

THE CLEVELAND COMMERCIAL CAR DEALERS' ASSOCIATION.
By George W. Wadsworth,
President.

The following letter was sent to the directors of the Cleveland Automobile Manufacturers' and Dealers' Association:

"On several occasions lately your Mr. —— has given interviews to our Cleveland papers attacking the use of heavy duty trucks. We refer particularly to an interview published in the ——— under the heading, "Roads Crumble Under Heavy Truck Traffic."

"Inasmuch as several of the directors of the Cleveland Commercial Car Dealers' Association are also directors in your association, we feel free to point out the inconsistency of your organization attacking us in this public manner. The language was peculiarly unfortunate. We can only explain the matter by believing that Mr. ——'s action was unauthorized.

"We object strenuously to having the subjects affecting the truck industry handlel by anyone representing you whose knowledge of trucks is only superficial. Our business interests have been injured by these interviews. This you will readily appreciate, particularly in view of the drastic laws against heavy trucks proposed each year by our legislature at Columbus, which is controlled by the farmers' vote. Publicity of this nature is especially injurious when farmers as a body have a rabid and unjustified prejudice against heavy trucks. The main objection, however, to the statements reported to have been made by Mr. —— is that the reaction from such loose talk would inevitably seriously injure truck transportation and thus be very detrimental to the public.

"Let there be no division in the industry. Let us take advantage of this situation which has been created that good instead of harm may come therefrom. We can easily do this by focusing public attention upon our carelessness and ignorance in our road building. We should get our papers to print pictures and cite instances in our parks and boulevards where frost and excessive rainfall have caused the roads to "crumble and heave up" where nothing but passenger cars and light vehicles are allowed, to prove the poor construction of our streets and roads. We should lay emphasis upon the fact that we had the same road conditions before passenger cars came into use.

"If we all work together in harmony, avoiding any tendency to pit class against class and focus public opinion upon the necessity of building roads with at least a ten-inch concrete base using good materials and with proper drainage, we will be able to get roads like Euclid Avenue from Willoughby to Painesville, which was built about seven years ago and still almost as good as new."

CLEVELAND COMMERCIAL CAR DEALERS' ASSOCIATION.
By Geo. K. Wadsworth.

The following resolution was unanimously adopted by the Commercial Car Dealers' Association:

WHEREAS, there appeared in the ——— an article with the heading "Roads Crumble Under Heavy Trucks," which article was grossly biased and tended to retard the cause of good roads, and

WHEREAS, the very heading of the article and its wording throughout tended to create the impression that the statements quoted were authentic, and

WHEREAS, the Cleveland Commercial Car Dealers' Association hereby publicly admits on behalf of ourselves and our truck owners that trucks do their share of damage to roads and also that we are anxious to go on record as standing for impartially enforcing our present road laws.

NOW, THEREFORE, BE IT RESOLVED, that we solemnly object to having heavy duty trucks in particular held up in our newspapers to public condemnation and popular prejudice by quoting half truths of malicious misstatements of facts made by County officials or anyone and have them given such publicity or made so apparently authentic as was done in the article of which we complained. This article tended to fix the entire blame of bad road conditions upon the heavy truck, which was made to appear in the light of a big business enterprise trying to grab the transportation of the country away from the railroads by the use of public highways as private freight lines. In their greed truck drivers were supposed to be wrecking roads by carrying great overloads and driving at speeds entirely beyond the range of remotest possibilities.

NOW THEREFORE, we call upon the Cleveland papers, county officials, the entire automobile industry and in fact all those interested in good roads to take advantage of this situation and with just as much publicity show the public the real facts.

(1) That we are building roads as we did ten years ago.

(2) That roads actually did "heave up and crumble" before we even had automobiles.

(3) That frost and spring thaws, as well as excessive rainfall, cause the major part of road troubles, together with lack of proper drainage and the poor construction of the roads themselves.

(4) That the entire automobile industry stands for strict enforcement of our present laws, not only for the heavy truck, but for the light truck and speeding passenger car.

(5) That we are repairing pavements yearly over wide stretches where the road itself is so inadequately constructed that great holes reappear before the repair gangs move out of sight. An instance of this is Euclid Avenue, east of the East Cleveland "Y," where repair gangs even now are laying bricks in the soft sand. This is done at least once every year and thus the public's money is wasted as the traffic crumbles the road almost before the repair gangs can finish their work.

(6) That roads "crumble and heave up" in places where heavy trucks are excluded. We should show this by pictures of sections of our boulevard like Edgewater Park or Lake Shore Boulevard in front of Euclid Beach where heavy trucks are not allowed. This will educate the public to the knowledge that we must build our roads to meet modern conditions.

(7) Transportation costs enter into everything we make, eat or wear. Truck transportation of today is nearly as big a factor as railroad transportation and, therefore, affects every person. Everyone knows that heavy duty trucks do the major part of the work and do it at a much lower figure than light trucks and proved by all cost records and government bulletins. To do away with heavy duty trucks would immediately boost the High Cost of Living and widely affect everyone. Let us all recognize that we threw railroads into politics and are just now emerging from a serious situation as the result. To do likewise with truck transportation it would be equally costly to every man, woman and child in the United States.

We ask our newspapers and all good roads advocates to unite on these three propositions:

First: That we stop arguing as to whether horse-drawn vehicles, passenger cars, light trucks or heavy trucks cause the most trouble and direct public agitation against the building of cheap roads, instead of against each other.

Second: That we aid the authorities to enforce our present road laws and avoid stirring up popular prejudice against the use of our highways by any legitimate traffic.

Third: That we make a concerted effort to take road building away from County jurisdiction and place it in the hands of the centralized State Highway Department in order to get uniform and connected modern highways throughout the State.

We recommend that The Cleveland Automobile Club, The Cleveland Automobile Manufacturers' and Dealers' Association, The Cleveland Commercial Car Dealers' Association and The Chamber of Commerce join us in engaging a man as good roads advisor and prorate the expense. Until we can get some centralized authority to see that our roads are planned right and built according to specifications, we need an efficient and disinterested man to have a check on County road inspectors and careless road contractors and someone able to address meetings and get publicity in communities where improper roads are contemplated and before contracts are awarded. Give this man one or two assistants if necessary for good roads affect every commercial organization in the city and it is time we organized to correct conditions we all recognize as intolerable.

THE CLEVELAND COMMERCIAL CAR DEALERS' ASSOCIATION.
By Geo. K. Wadsworth,
President.

These letters and resolution are reproduced to show the methods employed by the truck dealers to counteract the propaganda against the truck, and that results were obtained was noted in the change of heart of some who are held responsible for the article attacking the truck. At the present time of writing effort is being made to combine the four associations along the plan suggested in the resolution, excerpts from which have been published by the press.

The writer spent half a day with an automobile inspecting the roads under discussion, particularly with a view to noting the condition of the highways costing $80,000 the mile. The conditions were found as stated in the resolution (paragraphs 5 and 6) while the accompanying photographs indicate the actual conditions. On one road where there is heavy truck traffic, a main artery, the road is in perfect condition although it is said to have been laid several years ago

Value of Dealers Organizing

The moral to this article is that were the truck dealers of Cleveland not organized the newspaper article would have placed the blame of the poor roads upon the trucks, and the public would have accepted the statements as bona fide, as it generally does. In view of the fact that roads have suffered through the unusually severe winters of late, coupled with the fact that they were not substantially built, there is more need than ever for the truck dealers to organize and combat such propaganda, which is at the best a slow poison, as appeared in the Cleveland paper and is being published elsewhere.

The suggestion is made to separate truck dealers' organizations, and to those being organized, that they follow Cleveland's example and co-operate with the owners' and other automotive associations in bringing about sane legislation and the construction of good roads. By combining, which does not necessarily mean that the truck dealers will be absorbed by the other organizations, the public can be educated to the need of good roads for all vehicles, to the economic value of the truck, and best of all by presenting a solid front the automotive industry can prevent the enactment of drastic legislation. The old adage, "United we stand, divided we fall," is a slogan the various dealer and other automotive organizations should bear in mind.

Electro-Magnet Expedites the Loading of Trucks

Iron and Steel Warehouse Employs Magnets in Moving Boiler Tubes and Plates. Especially Useful in Moving Scrap

By K. HERRICK

AN example of the possibilities of loading and unloading motor trucks by means of electro-magnets, in comparison with chain sling and hand loading and unloading may be seen in the four-acre warehouse of Morris, Wheeler & Co., dealers in iron and steel, Thirtieth and Locust Streets, Philadelphia.

Generally conceded to be the best equipped iron and steel warehouse east of the Mississippi River, this new structure is said to be the only one in the whole United States where magnets are used to move steel plates and boiler tubes. The company deals in structural shapes of all sizes, iron and steel bars, plates, rails, sheets, boiler tubes, hoops, bands and the like. Because of the many types of heavy material handled, numerous problems of loading, unloading and storage are presented.

About a year and a half ago the company decided to install magnets, as the old method of lifting short plates and heavy gauge sheets with clamps at the end of crane chains was found unwieldy, slow and dangerous.

Electro-Magnet Lifters Employed Where Other Agencies Are Inadvisable

Boiler tubes are especially susceptible to rust and are shipped by rail in box cars, the surface of each tube first having been carefully greased, or oiled. The company studied how it could adapt the electro-magnet to handle these boiler tubes, as well as plates and sheets, as chains are inadvisable for lifting, because of their tendency to mar and otherwise damage the material. Neither are rope slings approved for lifting the heavier tubes, as the rope slides too easily on the greasy surface.

This is where the electro-magnet outclasses other methods. The grip of the magnet is secure and does not mar and there is a minimum of swinging and gyration of the object lifted.

These and other problems having been solved, the company has found the magnet economical in time and labor.

Morris, Wheeler & Co., Inc., use three magnets, made by the Cutler-Hammer Manufacturing Co., of Milwaukee, Wis. Two of them are rectangular, thirty-six by eighteen in., and the other is circular, being thirty-six in. in diameter. They are operated from electrically propelled overhead cranes, of which the company has eight.

The circular magnet is used mainly for loading and unloading scrap. The magnets will lift 2,000 pounds each, according to the character of the material. The electro-magnet requires direct current and as Morris, Wheeler & Co. have alternating current for their plant, it was necessary to convert it to direct, so far as the magnets were concerned.

Accordingly, the company installed a 6 kw. motor-generator set to serve the magnet, at a cost of about $2 a day.

The magnets are used for loading boiler tubes and steel plates, as already mentioned; for unloading tubes into cradles and racks, pigeon hole or otherwise, according to size; for unloading and piling plates and sheets wherever desired; for pushing cold rolled steel into box cars and the like. They are thus useful in loading and unloading both trucks and cars.

Electro-Magnet Depositing Steel Plates in Orderly Piles in the Warehouse

Warehouse layout is important in its relation to loading and unloading and before actual description of these processes, it is necessary to state certain facts relative to locations and strategic points in the warehouse.

Layout of Warehouse Minimizes Crane Travel

The Morris, Wheeler & Co. warehouse contains three sidings of the Pennsylvania Railroad. The building is at right angles to the siding in that portion of the double structure known as No. 2 warehouse — although both warehouses are under the same roof—and lengthwise of the tracks in No. 1 Warehouse, the object being to afford facilities for setting a carload of material in each one of the seven "bays" into which the space is divided, to unload in the respective storage areas to the best advantage. The general plan here has been to make the distance to be traveled by the material from the car to the storage area as short as possible. Care also has been taken in planning the driveways, they being designed while keeping in mind the fact that a 5½-ton Mack truck—the largest type of motor vehicle used by the company—will turn around within a circle having a twenty-seven foot radius.

The eight cranes operate in the seven bays, the length of the crane run or bay in each case being about 300 feet. In one instance, however, it was found necessary to install two cranes in one bay 315 feet long, to handle loading and unloading simultaneously.

Where the crane runs are parallel to the railroad sidings, bars are loaded and unloaded; and where they are at angles, structural shapes and plates are handled.

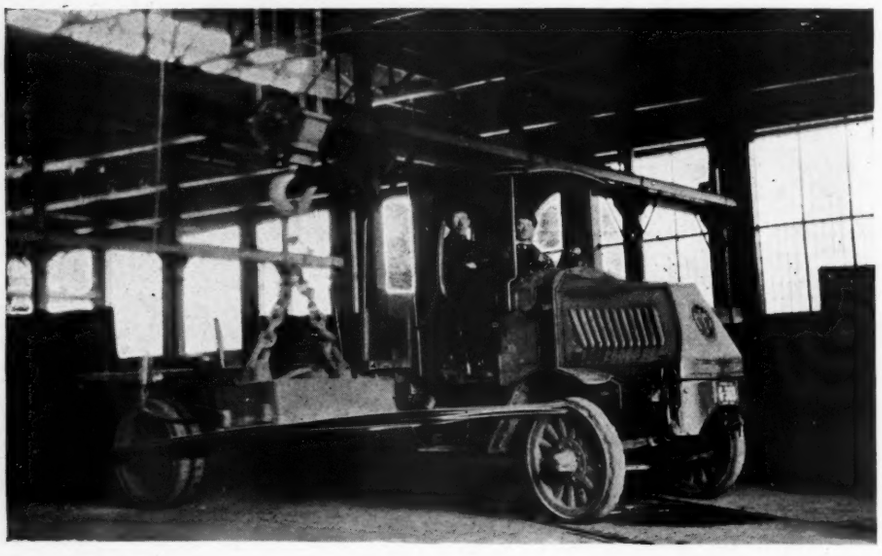
Magnet Cable Should be Free From Slack

In operating with the electro-magnet, it is necessary that the magnet cable extend to the lowest and highest points that the magnet can reach; in other words, there must be no slack. If there is any, the cable more than likely will be damaged by getting crushed and rubbed in the lifting operations, this finally putting the magnet temporarily out of commission. As there was no invention on the market that would properly eliminate the slack of the cable, in handling heavy materials, the company worked out its own device on which a patent is pending and of which, therefore, the following general description must suffice:

A double line of wire feeds the magnet. The current from the feed line, in this device, which might be termed an electric current transmission reel, is taken by a collector arm on the crane and fro there is carried over to the magnet, the slack of the cable being taken care of automatically by a reel. One thousand dollars, at the time of purchase, covered the cost of a single magnet and motor-generator set; but the wiring was extra and depended on local conditions. This cable reel has saved considerable expense in replacements of the cable, due to the abrasion mentioned, where there is slack.

The company also worked out a rheostatic control, whereby one man can lift with the magnet as many, or as few plates as he desires, within the capacity

of the magnet; or drop one or more from the number of plates he is raising if he finds he has too many, in order to end his pile with just the required number of plates. This is done by a method of power control which the operator is able to "get the feel of" through the experience of constant practice with the magnet. For instance: The operator may put on full power to lift twelve plates at once; reducing the power a little, he can drop off one plate. He soon learns the proper application of power, either to pick up, or release a plate.



Rectangular Electro-Magnet Lifting Large Plates to Body of Five and a Half Ton Mack Truck

A single magnet will not always suffice where especially long and limber material, like the lengthiest bands, is being handled. In such cases the approved practice is to use a chain sling, or else rig up a spreader beam with a magnet suspended from each end. This may be either an I-beam, or two channel irons bolted together. A feed wire will, in this case, run to each magnet in the same manner that one magnet is fed with current. The two magnets having contact each a little distance from the end of the material being lifted, take firm hold and keep the otherwise limber material quite rigid while it is being moved off or on a truck, or into a pigeon hole rack.

Workmen Are More Cautious

Using the electro-magnet in loading and unloading motor trucks has had a salutary effect on the workmen by keeping them out from under loads—a desirable thing in any event. At first, especially, the men are prone to regard a magnet as something very mysterious and are nervous about the possibility of its dropping its burden on them. Of course, there is less probability of the power being completely shut off during an operation than there is of a sling breaking. However, the general effort is to make the men unusually careful about exposing themselves to accident.

Where magnets can be used, they can load trucks at much less expense than other means of loading. While figures are not available, the company states that much money has been saved since the installation. Operating with a magnet is more economical than using a chain or a rope sling, for one thing, because, when necessary, one man in the crane and one on the floor can load and unload; whereas by the other methods—chain and rope sling—it is customary to have from three to four men on the floor and one in the crane.

As a means of loading scrap, according to the company, the magnet shows speed and economy over other methods.

In piling plates on the warehouse floor in unloading operations, as the plates are released by the magnet overhead, a man standing on the floor taps them slightly with a sledge, thus stacking them instantly in orderly rows. In one of these good-sized piles the plates sometimes weigh 100 tons.

The largest of the plates are half-inch by 72 inches wide and are twenty feet long. A carload of plates weighing 100,000 pounds can be unloaded in about two hours, depending on the shape of the plates. These vary in thickness from one-eighth of an inch to half an inch and in sizes up to six feet by twenty. Boiler tubes weighing 50,000 pounds to the box-car load take about four hours to unload. They run up to six inches in diameter and twenty feet in length.

Use Specially Made Truck Bodies

Morris, Wheeler & Co. have a fleet of seven trucks—four 5½-ton Macks and three 2½-tonners of the same make, all with stake bodies and cabs.

The bodies were especially made for the company's purpose, so that there is a "shoulder" space of fifteen inches on each side of the cab, for loading on the platform of body and keeping in place such material as 60-foot structural shapes.

The company began to use trucks about three years ago, retaining, however, its nine teams and adding as occasion required to its motorized equipment. The company believes that for its special purposes, its own trucks carry the material more economically and satisfactorily than could be done by contracting for transportation service. It has been found that in the iron and steel business there are unavoidable delays in loading and unloading not common to business in other lines, and it has been decided that at the price per hour which contract trucks are asking, it is more economical to do the work with company-owned trucks and company labor.

The company has a steady force, expert in handling the material and thoroughly familiar with the deliveries.

Big Boiler Tubes Just Unloaded From Motor Truck by Electro-Magnet, Being Guided Into Rack by Floor Gang Man

All outgoing material is first weighed. Four scale men, each having charge of a gang, are responsible for weighing the material and getting it on the trucks and started on its way, being particular to keep the scales clear for the next outgoing vehicle.

Where chain slings are used in hoisting or lowering material by means of a

(*Continued on page 100*)

EDITORIALS

Financing the Small Dealer

THE credit situation brought about by the action of the Federal Reserve Bank is in many ways a blessing in disguise, although some sections of the country the condition is somewhat more serious than in others. On the whole, however, the credit situation is easing up somewhat although money will be tight for at least the next six months. The party most affected by this situation is the small dealer. The large distributor does not, as a rule, find it difficult to obtain the necessary collateral from his bank for the simple reason that he is in more intimate contact with the banker and has sold himself to the banker thoroughly, perhaps, long before the credit situation became acute.

Those dealers who have the confidence of their bankers will not experience any difficulty in securing funds necessary to carry on their business. Too many of the smaller dealers have in the past been "getting away with it," but will have a different road to travel in the future. In a few instances the larger manufacturers could help the situation by carrying the dealers' paper or assisting the dealer in some manner financially until the credit situation becomes easier. The financing companies who make a business of handling automobile papers are doing their share, but they also are restricted by the banks. However, the automobile dealer must remember that other industries are even harder hit than the automotive industry. The concensus of opinion of those in intimate contact with the financial situation, is that, undoubtedly, the money market will be much easier after the first of next year.

More Attention Must be Given to the Sub-Base

RECENTLY the Federal Highway Council appointed a committee known as "The Committee on Sub-Grade and Its Relation to Road Surfacing and Traffic." The object of this committee is to study the foundation sub-soils and to suggest treatment which will eliminate the destructive action of frosts in the spring, thus saving millions of dollars annually in the repairing of damaged roads. This committee has indeed a task ahead of it which requires the attention of everyone interested in the country's road building program.

Highway engineers agree that this subject has been given too little attention in the past. The main reason for this seems to be the lack of funds for carrying out of investigations before laying the road. The tendency at the present time is to lay the same thickness of slab over all kinds of sub-soil, thus giving over the more stable soils and those least affected by frost, a road surface more expensive in some cases than necessary, while over the proper grade of soils and those particularly affected by frost, a road surface entirely too weak to carry the traffic. This method of building roads is entirely wrong and is simply a waste of money. It is just as illogical as trying to build a skyscraper upon sandy soil.

Our road building program is a subject to which the dealers in this industry must give their earnest attention. Until we build roads which will stand up under motor truck traffic, highway transportation will not progress as rapidly as it should. When roads carry loads without breaking up, real highway transportation will begin.

Vocational Selling

WE hear a good deal today about vocational selling in connection with the sale of motor trucks. To many dealers this sales plan appears as something that requires an extra large sales force or an unnecessary expenditure of money. Such, however, is not the case. Any dealer can establish a vocational selling plan without a large outlay of capital. This plan is simply the application of the highest type of salesmanship, which, unfortunately, is lacking in many retail establishments.

In an analysis of the vocational selling plan one is confronted with one of the oldest principles of salesmanship, which is simply this: That the salesman should know something about the prospect's business or the class of work for which the truck is intended before trying to sell the prospect. This method of selling resolves itself into a more intensive study of the prospect's requirements before closing the sale. Vocational selling does not mean selling a four-ton job where a two-ton is sufficient nor does it mean selling a truck to a prospect for use in inter-city hauling on a route that is already crowded.

Vocational selling does require a little more effort on the part of the salesman, in systematically

gathering such information which will assist him in selling prospects in similar lines of business. Where a number of salesmen are employed by a dealer this plan can be followed out very profitably by dividing the sales territory according to vocations instead of geographically. No hard and fast rules can be laid down in connection with this plan. Each dealer must decide which method of selling best suits his territory. Undoubtedly, the vocational selling plan will produce more satisfied customers provided the work is carried out conscientiously, simply because the customer will have more confidence in the salesman and the house he represents. A number of factories are advocating this method of selling and to that end are conducting research departments which are gathering information and data on all vocations in which motor trucks can be utilized. This information is in turn forwarded to the dealers and kept on file for the use of their salesmen. The plan has many meritorious features.

Sub-Committee to Handle Branches of Highway Work

THERE is to be no let-up in the nation-wide movement to bring the highway into its logical position as an efficient factor in transportation.

This has been determined by the Federal Highway Council in co-operation with Chambers of Commerce, Commercial Club, civic bodies and other affiliated organizations. Committees are being appointed to direct the work in its more important branches.

The Transportation Committee of the Council already includes men with wide experience in transportation problems. Co-operating with the committees are Dr. R. S. McElwee, Director of the Bureau of Foreign and Domestic Commerce, Lieutenant Colonel J. M. Ritchie, of the War Department, and Lee L. Robinson, of the United States Council of National Defense.

W. J. L. Banham, General Traffic Manager of the Otis Elevator Company, New York City, and a member of the Executive Committee of the National Industrial Traffic League, is in charge of a committee on policy toward other forms of transportation. His committee will make a close study of short haul and terminal problems. This study will include transportation problems in new territory, transportation surveys, the motor truck in terminal work, store door delivery, motor truck statistics, including costs, rates, etc., and the use of trailers in reducing cost per mile.

J. H. Collins, Manager of Commercial Survey Department, Chilton Company, of Philadelphia, and formerly of the Bureau of Markets, United States Department of Agriculture, is chairman of the Committee on Rural Motor Express. The scope of the work of this committee embraces a study of franchises, insurance, uniform receipts and bills of lading, marketing, return loads, and the present status and development of machinery for putting the rural motor express into actual operation.

The study of highway transport functions of State Highway Departments, including snow removal, traffic surveys and traffic control by State Highway Departments, to the end that constructive suggestions for assistance may be offered where desirable, will be in charge of David Beecroft, Directing Editor of The Class Journal Company, New York City.

The development of a policy of co-operation with motor truck users' organizations will be in charge of W. H. Stone, Associate Editor of the Manufacturers' Record, Baltimore.

Co-operation in educational work with universities and schools will be directed by Professor A. H. Blanchard, professor of highway engineering, University of Michigan, and president of the National Highway Traffic Association.

The general policy of the Transportation Committee of the Federal Highway Council is under the direct charge of Charles W. Reid, formerly Executive Officer of the United States Council of National Defense.

The Council has just received notification from George W. Taylor, President of the American Railway Express Company, that their vice-president and treasurer, F. S. Holbrook, would represent the Express Company on its transportation committee. When completed the Committee will include representation from all agencies of transportation.

E. S. Foljambe Joins Goodyear Company

E. S. Foljambe, directing editor of the Chilton Publications for thirteen years, has recently resigned that position in order to become connected with the new Los Angeles factory of the Goodyear Tire & Rubber Co. The change was made because of considerations of his health and that of his family His long connection with the Chilton Company was largely responsible for the high editorial standing and success of the Chilton Publications. His editorial efforts always showed a thorough understanding of problems affecting the automotive industries, and he goes to his new position with the best wishes of his former associates and the officers of the company. His activities in behalf of the automotive industries were reflected in the various organizations connected with the industry and he served one term as first vice-president of the Society of Automotive Engineers.

The Automotive Road Insurance Company has been formed in New Orleans, La., with a club organization, the car owner member paying a fixed monthly fee. The company contracts to bring the member's car in or repair it on the road whenever and wherever a breakdown occurs. Everything except tire troubles will be taken care of.

Airplane View of the New Goodyear Plant at Los Angeles

The new plant of the Goodyear Tire & Rubber Co. is located in Ascot Park, Los Angeles. In 1919, the Goodyear Company purchased this tract which is one-half mile wide by two miles in length, and contains 622 acres. The famous Ascot speedway will be dismantled, while the grandstand, which at the present time houses the temporary offices of the factory organization, will be allowed to remain until the offices can be installed in their permanent location in one of the factory buildings. The tire factory is of steel and concrete, three stories high, 300 by 580 ft., and the cotton mill, which will be operated by the Goodyear Textile Mills Co., is three stories, 134 by 580 ft., in addition to which there is a warehouse of three stories in height. Power is supplied by three 600 hp. boilers of oil-burning type. The operation of the two manufacturing units, the tire plant and the cotton mill, will involve the employment of about 9,000 workmen. The daily tire output will approximate 7,500, and the cotton mill will turn out weekly 75,000 pounds of cord fabric and 75,000 pounds of woven fabric.

Time and Money Saved by Utilizing the Motor Truck

By E. E. PIERSON

AN unusual feat was performed by a two and one-half-ton Bethlehem, owned by the Northwestern Trucking Co., Bloomington, Ill., which makes a specialty of heavy and long hauls, when it was used to complete the transportation of a bottling table weighing about 5000 lb.

The Malt Made Co., Chicago, Ill., recently purchased this bottling table in St. Louis. Due to the fact that the only line operating an industrial track into the plant of the table manufacturer, is the electric line known as the Illinois Traction system, it was decided to load the table upon a flat car and move it by the tractor line to the northern terminus at Bloomington and thence by truck from Bloomington to the plant in Chicago. Before this move was decided upon, a careful check was made of the expense by other routes and methods. In the event that a steam line had been selected, the various charges would aggregate close to $500. The freight charges on the traction line to Bloomington and the movement by truck from this city directly to the plant of the company in Chicago, was found to cost approximately $250. The charge for the truck was $180. The saving in time and expense was thought well worth the combination of traction line and truck and the movement was successfully made, while a return load was picked up from Chicago to Bloomington.

The Association of Commerce in Bloomington, Ill., has been working hard to interest merchants in the question of truck shipments and seeks to co-operate with Peoria, Decatur and other cities. When a truck moves with a load of merchandise to any contiguous city, the business men's organization is notified and an effort made to furnish a return load. This spirit of co-operation is being encouraged in every way possible. Unfortunately, merchants, who should be vitally interested, have been slow to respond to the appeal for information concerning return loads, despite the fact that it is to their financial interests to do so. Like all other reforms, progress is slow and the process of education, appears discouraging at times. However the Association of Commerce believes that the truck proposition is too big to be overlooked even because of scant appreciation, and will continue the efforts to increase the volume of business handled and add to the number of truck converts and patrons.

Trailers and Pneumatic Tires

By M. HERRMAN, Warner Mfg. Co.

THE trailer follows the truck, both literally on the road, and in the actual development of these two related hauling units. Naturally the trend towards the pneumatic tire applies to the trailer as well as to the truck.

We have had sufficient actual experience, hauling under every conceivable condition, now to know that pneumatic tires mean a saving in depreciation on both truck and trailer—a saving in repairs, particularly on the truck; a saving in fuel and a saving of engine troubles. High speed is made possible—an important consideration for companies engaged in intercity transportation. We have acknowledged the fact that any vehicle will have to stand considerably less punishment when equipped with pneumatic tires by adding one-half to one-ton additional capacity to the rated standard capacity of solid tire equipped trailers.

More trucks each day are now being equipped with pneumatic tires, in consequence of which fact it becomes necessary to dispense with the solid pressed-on tire as trailer equipment, as fast as possible. It is fallacy to try to make a solid tire equipped trailer operate economically and successfully behind a pneumatic tire equipped truck as such a method will mean either the retarding of the truck to the speed limited by the solid tire on the trailer, or to endanger the load on the trailer if the speed compatible with pneumatic tires on the truck is maintained.

Giving due consideration to this new and most recent development in the field of trailer operation, Warner trailers are now largely pneumatic equipped, as we find that this equipment insures better traction, especially over soft roads, and removes the tendency to skid on wet pavements, and on hard country roads covered with a slimy surface after a rain.

We have had occasion to observe that solid tires are usually allowed to run down to ½ in. or less in thickness before they are replaced, which means that the last few hundred, or even thousand miles, will be run on a tire which, as to resiliency is about as bad as a steel tire. The pneumatic tire, on the other hand, must be replaced when it is partially worn out, but will give full resiliency as long as there is enough tire left to hold the air.

From these few points it can clearly be judged that the pneumatic tire is desirable as equipment, both on truck and trailer, because of the extra speed, better traction and saving in depreciation.

The trailer as a hauling unit has, within the last twelve or fourteen months, been getting the recognition it deserves. Trucking costs demand the increased capacity which the well-built trailer provides, and the dealer who sells a truck now, of he is an up-to-date dealer, will sell his customer proper transportation by selling him with the truck, also a trailer.

Iowa Motor Trades Bureau

The Iowa Motor Trades Bureau, Inc., A. J. Knapp, secretary, with offices in the Shops Bldg., Des Moines, Iowa, was organized with thirty-six members in March, 1919. The Motor Trades Bulletin, the official organ of the Bureau, appeared in magazine form last August, and the present issue is number ten, has 34 pages, and has not only served materially to strengthen the Bureau within the state but has given prestige to the organization from coast to coast. Secretary Knapp is the editor.

The Bureau secured the provision that permits the registration of motor vehicles with the county treasurers; reduced the license fee for motor trucks about fifty per cent. from the original schedule; reduced the price of second and subsequent sets of dealers' number plates from $25 to $15 per set, thereby saving the dealers of Iowa for 1920 alone on plates $20,000 to $30,000, and by the reduction of truck fees saved motor truck owners a large amount of money and thus removed a serious sales resistance for dealers in motor trucks.

The service rendered by the Bureau to its members has been a varied and highly satisfactory one. It has ascertained rulings on taxation and the motor vehicle law, method of assessment, investigation of companies, corporations, and associations, furnishing of programs and securing of speakers for special county Bureau meetings, assembling of facts and data on the cost and value of paved roads in other states, looked after the plan of campaign and literature used by the counties of this state that have voted successfully on road surfacing, and has acted as a clearing house for such information.

The Louisiana-Mississippi Automotive Trades Association will hold its fourth semi-annual convention at Gulfport, Miss., October 6 and 7. Three-fourths of the Mississippi industry is expected to attend. Meetings are held alternately in each state. Nine-tenths, approximately, of the industry in northern Louisiana are members of this association.

The Washington, D. C., Association has had a committee gathering data on a form of bill of sale which it intends to give every owner at the time he purchases a car. Pennsylvania has a law requiring the giving of a bill of sale. Virginia, New York and Missouri, and some other states, have similar regulations.

The Pennsylvania Section of the Society of Automotive Engineers held its spring outing at Strath Haven Inn, Swarthmore, Pa., afternoon and evening of May 22. Wives, friends and relatives were included. There was arranged a program of sports, there was an excellent dinner, without speeches, and dancing. H. Hollerith, Jr., was chairman of arrangements.

News of the Trade in Brief

(For Factory Items, Personals, New Incorporations, Etc., See Pages 104-110)

Annual Meeting of N. A. C. C.

The annual meeting of the N. A. C. C. was held in New York the first week in June, and many matters of great import to the industry were considered. Transportation was considered as improved; bankers were found to be showing little disposition to discriminate against the trade, though showing evidence of care in their choice of individuals to whom credit should be granted. In few cases have bankers shown other than the utmost consideration for enterprises of a substantial nature, and this policy was agreed to as having a beneficial effect. Money was predicted as probably tighter as the time for moving crops approaches. Turnover of employees is seventy-five per cent. of the normal rate of the first quarter of the year. The truck business is booming. The gasoline emergency is admitted by many authorities to be temporary.

The annual election returned Col. Charles Clifton, chairman of the board of directors of the Pierce-Arrow Motor Car Co., to the presidency. Roy D. Chapin was elected vice-president, moving up from the second vice-presidency. Windsor T. White was re-elected vice-president representing the truck members. C. C. Hanch, of the Maxwell Motor Co., was elected second vice-president for the passenger car division, and Mr. Hanch's former office as secretary was filled by A. J. Brosseau, of the International Motor Truck Co. H. H. Rice, of the General Motors, was re-elected as treasurer. Col. Clifton, Horace E. Dodge, and Windsor T. White were re-elected directors. Two new members were added to the board, Harry M. Jewett, Paige-Detroit, and W. C. Sills, Chevrolet.

Boston to Hold Truck Show

Boston, as well as New York, will have a truck show next year, and it will be held in March, and conjointly with the annual automobile show. Chester Campbell was re-elected secretary of the Automobile Dealers' Association at the annual meeting when the truck show decision was reached.

Lincoln Highway Marked

The Lincoln Highway will be permanently marked this summer. Enamel steel signs will guide tourists from New York to Omaha. The Lincoln Highway Association will start a marking crew July first, with the co-operation of the Autocar Co. of Ardmore, Pa., through the interest of its president, a founder of the association. The Auto Car Co. will provide two two-ton trucks for carrying the crew, the poles, and the signs. Two young men from the University of Michigan have been engaged to do the work, and the truck drivers are supplied by Mr. Ludlum.

The expense of marking permanently some 1500 miles of through highway in an enduring way is about $20,000. To properly mark a through route two markers a mile are necessary. There will be 3000 permanent enamel steel signs, 10 x 21 in., carrying the standard Lincoln Highway marker in three colors of enamel. The signs are half round, screwed to eleven ft. posts, sunk three ft. under ground, and placed at every confusing

Coming Events

August 20 to 28, 1920—Springfield, Ill. Sixty-eighth Annual State Fair. Passenger Cars, Trucks, Tractors. B. M. Davison, Sec'y.

August 23 to 27, 1920—San Francisco, Calif. National Traffic Officers' Safety First Exposition, Auditorium. C. De Witt De Mar, Manager.

August 23 to 28, 1920—Erie, Pa. Fifth Annual Erie Exposition. Passenger Cars, Trucks, Tractors. C. R. Cummins, Sec'y.

August 23 to 28, 1920—Stillwater, Okla. Oklahoma Farm Power Show, under direction State Board of Agriculture.

August 28 to September 4, 1920—Milwaukee, Wis. Fifty-fifth Annual State Fair. Passenger Cars, Trucks, Tractors. Oliver E. Remey, Sec'y.

August 28 to September 4, 1920—Sherbrooke, Quebec. Thirty-sixth Annual Great Eastern Exposition. Passenger Cars, Trucks, Tractors. Sidney E. Francis, Sec'y.

August 28 to September 11, 1920—Toronto, Ontario. Forty-second Annual Canadian National Exhibition. Passenger Cars, Trucks, Tractors, Accessories. John G. Kent, Mgr.

August 29 to September 4, 1920—Danville, Ill. Fourth Annual Eastern Illinois and Western Indiana Fair. Passenger Cars, Trucks, Tractors, Trailers, Light Plants, Farm Machinery. George M. McCray, Sec'y.

August 30 to September 4, 1920—Columbus, Ohio. Seventieth Annual State Fair. Passenger Cars, Trucks, Tractors. Columbus Auto Show Co., Managers.

September 2 to 11, 1920—Quebec. Quebec Provincial Exposition. Passenger Cars, Trucks, Tractors. George Morisset, Sec'y.

September 4 to 11, 1920—Hamlin, Minn. Sixty-first Annual Fair. Passenger Cars, Trucks, Tractors. Thomas H. Canfield, Sec'y.

September 5 to 10—Lincoln, Nebraska. Fifty-second Annual State Fair. Passenger Cars, Trucks, Tractors. E. R. Danielson, Sec'y.

September 6 to 11, 1920—Wheeling, W. Va. Fortieth Annual State Fair. Passenger Cars, Trucks, Tractors. Bert H. Swartz, Sec'y.

September 6 to 11, 1920—Indianapolis, Ind. Sixty-fourth Annual Fall Auto Show, at Indianapolis State Fair. Passenger Cars, Trucks, Accessories only. John B. Orman, Manager, 338 North Delaware Ave., Indianapolis.

September 6 to 11, 1920—Rochester, N. Y. Thirteenth Annual Exposition. Passenger Cars, Trucks, Tractors. Edgar F. Edwards, Sec'y.

September 11 to 18, 1920—London, Ontario. Fifty-third Annual Fair, Western Fair Assn. Passenger Cars, Trucks, Tractors. A. M. Hunt, Sec'y.

September 11 to 18, 1920—Louisville, Ky. Eighteenth Annual State Fair. Passenger Cars, Trucks, Tractors. F. T. Kremer, Sec'y.

September 13 to 18, 1920—Syracuse, N. Y. Eightieth Annual State Fair. Passenger Cars, Trucks, Tractors. J. Dan Ackerman, Jr., Sec'y.

September 17 to 25, 1920—Peoria, Ill. Tenth Annual National Implement & Vehicle Show. Passenger Cars, Trucks, Tractors. George H. Emory, Sec'y.

September 21 to 24, 1920—La Crosse, Wis. Twenty-ninth Annual Inter-State Fair. Passenger Cars, Trucks, Tractors. C. S. Van Auken, Sec'y.

September 25 to October 2, 1920—Memphis, Tenn. Thirteenth Annual Tri-State Fair. Passenger Cars, Trucks, Tractors. Frank D. Fuller, Sec.

September 27 to October 1, 1920—Trenton, N. J. Thirty-third Annual Inter-State Fair. Passenger Cars, Trucks, Tractors. M. R. Margerum, Sec'y.

September 28 to October 1, 1920—White River Junction, Vermont. Fourteenth Annual State Fair. Passenger Cars, Trucks, Tractors. F. L. Davis, Sec'y.

October 2 to 9, 1920—Chattanooga, Tenn. Fourth Annual Inter-State Fair. Passenger Cars, Trucks, Tractors. J. Curtis, Sec.

October 4 to 14, 1920—Richmond, Va. Fifteenth Annual State Fair. Passenger Cars, Trucks, Tractors. W. C. Saunders, Sec'y.

October 6 to 8, 1920—Northampton, Mass. Annual Automobile Show, H. F. of H. Agricultural Society, Three-County Fair Grounds. A. J. Morse, Sec'y.

October 6 to 16, 1920—New York. New York Electrical Exposition, three floors, Grand Central Palace, includes Electric Passenger Cars. Trucks, Industrial Trucks, Batteries. George F. Parker, Mgr., 124 West 42nd St.

October 9 to 24, 1920—Dallas, Texas. Thirty-fourth Annual State Fair. Passenger Cars, Trucks, Tractors, Accessories. W. H. Stratton, Sec'y.

October 11 to 16, 1920—Meridian, Miss. Tenth Annual Mississippi-Alabama Fair. Passenger Cars, Trucks, Tractors. A. H. George, Sec'y.

October 16 to 26, 1920—Atlanta, Ga. Southeastern Fair Assn., Fifth Annual Fair. Atlanta Auto Assn., Managers of Show, 305 Connolly Bldg.

October 18 to 23, 1920—Jackson, Miss. Seventeenth Annual State Fair. Passenger Cars, Trucks, Tractors. Mabel L. Stire, Sec'y.

October 18 to 23, 1920—Raleigh, N. C. Fifty-ninth Annual State Fair. Passenger Cars, Trucks, Tractors. Joseph E. Pogue, Sec'y.

October 30 to November 14, 1920—Waco, Tex. Eleventh Annual Cotton Palace Exposition. Passenger Cars, Trucks, Tractors. S. N. Mayfield, Sec'y.

November 1 to 6, 1920—Jersey City, N. J. Annual Show, Hudson County Auto Dealers' Association, 4th Regiment Armory.

November 15 to 20, 1920—Chicago, Ill. Annual Show Automotive Equipment Association, Coliseum. A. B. Kauffman, Mgr.

January 8 to 15, 1921—New York. N. A. C. C. Show, Grand Central Palace.

January 8 to 15, 1921—New York. Truck Show under auspices Automobile Dealers' Association of New York.

January 29 to February 4, 1921—Chicago, N. A. C. C. Show, Coliseum.

March 15, 1921—Fort Worth, Tex. Twenty-fourth Annual Southwestern Exposition and Fat Stock Show. Passenger Cars, Trucks, Tractors. M. Sansom, Jr., Sec'y.

Conventions

Atlantic City, N. J., October 13 to 15, 1920—National Implement & Vehicle Assn. E. W. McCullough, Secretary, 72 W. Adams St., Chicago, Ill.

Atlantic City, N. J., October 22 to 25, 1920—Twenty-seventh Annual Convention National Implement and Vehicle Association, Traymore Hotel.

Chicago, Ill., September 1 to 3, 1920—Thirteenth Annual Convention of the National Gas Engine Association.

Cleveland, September 16 to 17, 1920—Credit Convention of the M. & A. M. A.

Gulfport, Miss., October 6 to 7, 1920—Fourth Semi-Annual Convention, Louisiana-Mississippi Automotive Trades Association.

Greensboro, N. C., September 24 to 25, 1920—Second Annual Convention, North and South Carolina Automotive Trades Association.

Minneapolis, Minn., January 11 to 13, 1921—Annual Convention of the Minnesota Implement Dealers' Association, West Hotel, Secretary C. I. Buxton, Owatonna, Minn.

Niagara Falls, N. Y., August 10, 1920—Automotive Metal Wheel Assn. Clinton House.

Foreign Events

London, England—October—Commercial Vehicle Show. November—Passenger Car Show, Olympia.

turn and cross road between the Hudson and the Missouri. The entire work, from the Atlantic to Omaha, will be completed before October first.

Summer Forum to Educate Employees in Business Principles

A "Workmen's Summer Forum" is to be organized this season in a number of plants in this industry for the purpose of bringing to the employee a sounder knowledge of the economics of business and an appreciation of the problem of management by the Business Training Corp., of 185 Madison Ave., New York City.

The need for such education is being realized more strongly by employers as they discover that industrial misunderstandings can usually be traced to wrong thinking and misinformation. It is found that the simplest facts which business men take for granted are absolutely unknown to the majority of workers. Instead of the occasional bulletins which some manufacturers are using, a thorough but easy and interesting course has been prepared covering the elementary principles of industry.

The Forum is organized to bring together plant managers, foremen and selected operatives for five consecutive weekly meetings to hear a lecture and to discuss text pamphlets which have been read during the week. The subjects of the five lectures and texts are: The Three Partners in Industry; Cheaper Goods with High Pay; Production Made Easy; Bigger Men in Better Jobs, and Making a Better Living. Each of these topics is treated in an interesting and graphic way in a short text of 75 pages. These texts are supplied by the Business Training Corporation, which also helps organize the Forum and furnishes the lectures. The staff of the Business Training Corporation maintains personal relations with each Forum member who is encouraged to ask questions on any subject upon which he desires further information.

More Trucks Needed by Farmers of New York State

A survey of the New York State farm market by county agricultural agents shows that in 38 counties there are 6118 motor trucks in use on farms and that there is a demand for more.

The following is a summary of the survey:

Question: Is there a real need for more motor trucks among farmers in your county?

Answer: Of the 42 county agents reporting, 31 (or 74 per cent.) stated that there is a real need for more motor trucks; 6 (or 14 per cent.) that there is no need; and 5 (or 11 per cent.) that the need was limited.

Question: What size truck does the farmer want?

Answer: In 29 counties the need is for trucks from 1 to 2 tons capacity; In 6 counties the need is for trucks of less than 1 ton; in 3 counties the need is for trucks from 2½ to 5 tons. The smaller sizes are used for milk hauling in sections where dairying is a minor operation; the larger sizes in truck garden sections adjacent to large cities.

Question: How many trucks are owned by farmers in your county?

Answer: Total for 38 counties 6118. Four counties gave no figures but one reported "many."

Question: How many farms in your county?

Answer: In the 41 counties replying there are 50,713 farms.

From the fact that 74 per cent. of the county agents stated there is a real need for more motor trucks and considering the present ratio of trucks to farms as 1 to 8.3, it is clear that New York State offers an attractive field for the sale of motor trucks.

Motor Truck Tour to Aid $60,000,000 Road Bond Issue

To create a state-wide interest in the good roads movement and assure the passage of the $60,000,000 bond issue at the November election for the maintenance of state highways, the Missouri Good Roads Federation has made arrangements to have a caravan of motor trucks, to be known as the "Bond Issue Truck Caravan," carrying good roads speakers, leave St. Louis about August 15 for a six weeks' tour through every county in the state of Missouri south of the Missouri river.

The trip will be concluded by a parade in Kansas City.

A similar caravan will leave Kansas City to visit all counties north of the river and will end in St Louis with a similar demonstration.

The caravans, traveling approximately 1800 miles each during the six weeks, will consist of government trucks loaned to the State Highway Department for road use, and will be remodeled to include one platform truck for speakers, one commissary truck, two trucks carrying good road literature, consisting of all forms of advertising, from buttons to posters, one baggage truck, an emergency truck and one truck each for the use of the Army, Navy and Marines.

Boston Transportation Bureau

BOSTON, MASS., July 1.—Motor truck owners of Boston have organized the Motor Transportation Bureau at 112 Water St., and have placed Dwight W. Sleeper in charge. Concerns operating 265 trucks are already members and the membership is growing rapidly. The bureau is a co-operative one, designed to provide the public with motor trucks without delay, for moving freight any distance required. The bureau also looks after the matter of securing return loads, establishing equitable shipping rates, etc. Restrictions are placed upon the financial standing of members of the bureau to insure protection of all merchandise handled by its members. Failure to properly perform work consigned to a member bars him from association with the bureau. The bureau also looks after the matter of insurance of loads for the truckmen and shippers. No charge is made for the services of the bureau.

Purchasing Agents Against Further Price Increase of Parts

The adoption of a resolution to discourage the tendency of parts and material manufacturers to advance prices was the outstanding feature of the purchasing agents' convention held under the auspices of the National Automobile Chamber of Commerce at Cleveland on June 18. The resolution is as follows:

Whereas, the price of material entering into the production of motor vehicles has reached a prohibitive point, and whereas a reaction on the part of the buying public has already set in against certain commodities, therefore, be it resolved that it is the sense of this meeting that it is contrary to the best interests of the industry to try and increase prices further and, be it further resolved that the membership of this association discourage to the fullest extent the tendency of parts and material manufacturers to advance prices of their products entering into motor vehicle production.

A number of subjects pertinent to the motor truck and passenger car industry were discussed from the purchasing agent's standpoint and among them was the question as to the utility of the stock chaser and best methods of following up material. The result of the discussions was that a stock chaser might not be needed in normal times but was essential at present with production trailing the demand, at least a hand vote showed such to be the case.

Contracts, prices, etc., were also gone over in detail by the purchasing agents and the feature of these discussions was the plea made by a member who pointed out the need of stabilizing the industry and that the purchasing agent was the person to carry out sound business practices.

Unbalanced inventories came in for their share of the discussion, high and low spots were named and suggestions for a remedy discussed informally. Certain material was reported difficult to obtain, and other appeared to be quite normal. According to several buyers certain products had dropped in price recently. The impression seemed to be that lower prices would obtain with some materials but that others would still remain high. The coal supply was a problem for some of the agents, they said.

Standardized purchase forms were discussed by a representative of the National Association of Purchasing Agents who submitted a tentative form on which the committee of his association was working. The result of the address was that it was voted to appoint a committee to meet that of the association and to co-operate in working out a form. It was also voted to appoint a committee to meet a similar body of the Motor and Manufacturers' Association as many of

the problems of the purchasing agents are of interest to the latter organization. It was also decided to hold quarterly meetings of the purchasing agents.

One of the results of the convention, which was presided over by Alfred Reeves, general manager of the N. A. C. C., was the bringing together of a large number of the purchasing agents of the industry not only in meeting but before and after, where ideas were exchanged and the members got acquainted with one another. Some who were long on certain material were able to help others who are less fortunate, and those experiencing difficulty in securing certain material or work were also aided. The committees and date of next meeting will be announced later.

Highway Motors Company, Succeeds Golden, Belknap and Swartz

The Highway Motor Co. of Defiance, Ohio, has been formed to succeed the Golden, Belknap & Swartz Co., and the Fruchey Machine Co., both of Detroit, in the manufacture of G. B. & S. motors for passenger cars and motor trucks. The purpose behind the reorganization is to put more capital and increased facilities behind the former G. B. & S. motor.

The new corporation is capitalized, under the laws of Ohio, at $1,500,000. Of this, $750,000 is in preferred stock, and $750,000 in common stock.

The officers are Charles H. Kettenring, Defiance, president; R. P. Kettenring, Defiance, vice-president; E. H. Belknap, Detroit, vice-president and chief engineer; J. W. Swartz, Detroit, vice-president in charge of purchases; J. W. Wright, Detroit, secretary and treasurer, in charge of sales and advertising, and W. R. Fruchey, factory superintendent.

A new factory has already been erected at Defiance, Ohio, and a complete line of up-to-date machinery is being installed, although the factories at Detroit will continue to supply motors until the new factory at Defiance is completely equipped and ready for operation.

O. K. Giant Battery Plant to Employ Two Thousand

More than two thousand skilled and unskilled men will be employed in the plant of the O. K. Giant Battery Corp., Gary, Ind., when the eighth unit of the plant is completed in the autumn. Two buildings are now in use, and the third will be ready and production will be pushed to the limit by July 15.

President P. B. Rabe announces a dry rechargeable battery that will put an end to the expense and battery troubles of the motorist. Contracts call for the erection and completion of twelve buildings by December 30 next, on the corporation's forty-acre tract, on 37½ acres of which will be erected forty buildings.

Electrical charging switchboards at a cost of $72,000 have been installed, having a charging capacity of 200,000 dry rechargeable batteries of all types, per day.

Bankhead Highway Tour Started

WASHINGTON, June 14.—The War Department today dispatched a convoy of fifty trucks over the Bankhead Highway to San Francisco. The convoy was speeded on its way with appropriate ceremonies, in which Secretary Baker of the War Department participated. Fourteen officers and 200 hundred men manned the trucks, which will cover more than 3,690 miles.

The convoy will be under the supervision of the Motor Transport Corps. It consists of a motor transport unit complete at war strength, one service park unit, a detachment from the Engineer Corps, and a detachment from the Medical Corps.

A daily mileage of 44.5 miles will be made, Sundays being observed as a day of rest.

The Bankhead Highway is an all-weather route to the Pacific Coast, with comparatively few steep altitudes, making an ideal route for trans-continental tours. All motor trucks in the convoy are one and one-half-ton capacity, equipped with pneumatic tires. The tour started from the "zero milestone" at Washington, and will pass over the main line of the Bankhead Highway through the cities of Fredericksburg and Richmond, Va.; Raleigh, Durham and Charlotte, N. C.; Greenville and Spartansburg, S. C.; Athens and Atlanta, Ga.; Anniston and Birmingham, Ala.; Tupelo, Miss.; Memphis, Tenn.; Little Rock and Hot Springs, Ark.; Dallas, Fort Worth and El Paso, Tex.; Deming and Lordsburg, N. Mex.; Douglas, Bisbee, Tucson and Yuma, Ariz., and Holtville and El Centre, Cal., arriving at San Diego about September 1.

Poor conditioned sections of the road may, of necessity, be detoured. The purpose of the trip will be to study the hardships which surround the transportation needs of the army on account of the lack of dependable and definite systems of highways and to secure data relative to the various types of motor vehicles and the relative value of solid and pneumatic tires for trucks. Solid tires were used very largely by the convoy in its trip over the Lincoln Highway last summer. Another object of the trip is to train officers and men in extended field operations and to recruit personnel for the various branches of the army.

The officers in charge of the convoy will have abundant opportunity to observe the behavior of motor trucks under the most trying road conditions, for there are many sections of the road which are at present in poor condition.

Aside from the value to the army, the operation of this convoy should have a beneficial effect in encouraging the various states and communities through which the route passes to improve the road for the local and trans-continental traffic to which it will be subjected in the future.

The Marked Road

The National Highway Advertising Co., 1532-1536 First National Bank Bldg., Chicago, announces "The first new national medium since the advent of street car advertising." For some time there has existed a national need for a highway marking system so organized and standardized that the motorist might not only be carried from city to city and highway to highway, but from state to state and ocean to ocean, with systematic definiteness.

To this end this company offers five markers to indicate left turn, right turn, straightaway, railroad crossing, and a distance marker on the outskirts of cities. Made of steel thirty inches in diameter, every marker is visible for a quarter of a mile. Advertising can cover three-quarters of the disc, on both sides, and the markers are seven feet above the roadbed.

Automotive Mechanics Course Included in Columbia University Summer Session

Columbia, which was one of the country's first universities to officially recognize the automobile, announced a course in automobile mechanics given at the twenty-first summer session which started July 6.

Fred Foreman Good will be in charge of the course to be given at this year's summer school. The mechanical and electrical problems dealing with the construction, operation, adjustment and care of the automobile will be studied. The work will include the assembling and disassembling of parts of the mechanism, locating and correcting troubles and a study of the essential principles of gas engines, carburetors, ignition systems, cooling systems, clutches, gears, the differential and the manipulation of tires.

The course, as announced, does not include driving lessons on the road. It is designed to be of particular value to the man who drives his own car but knows little about its mechanism, and to illustrate to teachers the use of the automobile for vocational instruction in high and industrial schools.

$10,000,000 Goodrich Expansion

One of the biggest expansions now in progress in the whole industry is announced by the Goodrich Tire & Rubber Company, Akron, Ohio. When completed it will increase the size of the plant 20 per cent and with equipment and machinery to be installed will aggregate $10,000,000.

The floor space of the company's factory buildings will be increased 779,000 sq. ft. by the new buildings, making a total of 4,554,304 sq. ft. devoted to the manufacture of tires and other rubber goods Several thousand additional workers will be needed next year to turn out the increased production planned.

A warehouse for raw materials is the largest of the new structures, and will be Akron's largest factory building, eight stories high and having 530,000 sq. ft. of floor space. It is rapidly nearing completion.

Building-nine extension will be used exclusively for tire making. It will be the

second largest of the new buildings with 200,000 sq. ft. of floor space. Other new constructions are being rushed by the contractors who are cramming weeks into days in their efforts to complete the building program during 1920.

Grocers' Association Urges Use of Motor Trucks

The Southern Wholesale Grocers' Assn. at its recent annual convention unanimously adopted the following resolution for the extended use of motor trucks as a means of speeding up delivery and reducing costs.

"Whereas, it has been clearly demonstrated that there are many advantages, economies and conveniences to be derived from a proper use of the motor truck as a means of transportation; particularly as relates to the handling of less than carload merchandise package freight, and,

"Whereas, there is a growing need for additional means of transportation to efficiently and expeditiously transport the rapidly increasing volume of this class of freight,

"Therefore, be it resolved by the Southern Wholesale Grocers' Assn. in convention assembled that we approve and hereby offer encouragement to those agencies which are endeavoring to promote along safe, sound and economical lines the use of the motor truck in transportation service."

Nash Distributors Gather at Kenosha Factory for Three-Day Conference

Distributors representing the Nash Motors Co., recently gathered at Kenosha for a three-day conference. The meeting was in charge of Charles B. Voorhis, vice-president and general sales manager of the Nash Motors Co.

Matters pertaining to value and quality of service rendered to Nash owners and the dealer, who operates under the distributor, were points emphasized by Mr. Nash and Mr. Voorhis in their talks to the visiting delegation.

The convention ended with an inspection of the new Milwaukee plant of the Nash Motors Co., now in process of construction, and where the Nash Four is to be produced.

Favors Prohibition of Strikes

Chamber of Commerce of the United States organization members have been asked to vote on two recommendations submitted by the Chamber's Committee on Public Utilities, that:

Strikes by employees of all public service corporations, performing public service essential to the lives, health, well-being and comfort of the people should be explicitly prohibited by law.

Suitable tribunals should be created by the law to adjudicate differences between employees of public corporations and their employers, and the decisions of such tribunals should be final and binding upon both parties.

Transfer Company Increases Trucks and Reduces Accidents

The remarkable influence being exerted on truck drivers through the Schools for Chauffeurs conducted under the auspices of the National Safety Council is illustrated in a report made by P. J. Kelleher of the Columbia Transfer Co., of St. Louis, Mo., that despite an increase from 30 to 110 trucks operated by that company accidents in which the company's trucks were involved were reduced 35 per cent. since the company's drivers have begun to follow the lessons learned during their attendance at the School for Chauffeurs conducted by the St. Louis Local Safety Council.

Lincoln Highway Ideal Section

The Lincoln Highway Association will build, just where as yet undetermined, an "Ideal Section" embodying the best that can be ascertained in modern highway construction, thus presenting a practical ultimate of highway building and beautifying. The entire highway engineering profession of America has been called upon for suggestions and recommendations.

Specifications desired as for a main traveled highway, carrying not less than 10,000 vehicles per day, and destined to carry a still heavier traffic during its lifetime. Considerations involve width of right-of-way, width of paving, its thickness, drainage methods, permissible cost per mile, lighting, and beautifying. Hundreds of engineers have already written to the Lincoln Highway headquarters, from all parts of the United States, showing interest, appreciation and enthusiasm.

Elimination of Muffler Cutouts on Trucks

At a recent meeting of the Motor Truck Committee, of the N. A. C. C., the members of the motor truck industry, a resolution was unanimously adopted, that "recommends that muffler cutouts on motor trucks be eliminated inasmuch as they are objectionable to the public and no longer necessary to utilize them for the proper operation of motor trucks."

A few years ago similar action was taken for passenger cars with the result that today nearly all such cars are built without cutouts. This is another example of the efforts of the motor truck industry's leaders to make their product conform to the public's convenience.

Cleveland Lays Down Truck Law

Strict enforcement of the city regulations limiting the size of loads carried by motor trucks has been ordered by Cleveland, Ohio. The ordinance specifies that no load in excess of 12 tons, including the weight of the vehicle, shall be driven over the streets except on a special permit. All vehicles over six tons in weight, including the load, must display signs describing their capacity. Not more than three trailers, each carrying 12 tons, are permitted, with a brakeman on the rear trailer.

Goodyear Los Angeles Factory Starts Up

The Goodyear Tire & Rubber Co.'s $20,000,000 new factory in Los Angeles has commenced production, just ten months after ground was broken. P. W. Litchfield, vice-president and factory manager of the Akron, Ohio, company, went to Los Angeles to personally build the first tire. Other high officials of both Akron and California participated in turning out the first pneumatic. The new factory has 2000 employees, and will ultimately employ 7000. Adjoining the factory an aviation field of 300 acres has been laid out with a large hangar for the airships which will travel between the Los Angeles factory and the company's cotton plantation near Phoenix, Arizona. Capacity production of tires will be 5000 per day when the new plant is in full operation.

Manufacturers Favor Waterway

Automobile manufacturers favor the project for canaling the St. Lawrence River, that ocean-going steamers may enter the harbors of the great lakes. The Overland company and other companies also, plan to load ocean liners with new machines if the canal plan is carried out. The plan is said to be opposed throughout the east, but has the support of an organization representing fourteen central and middle western states. The opposition contends that the New York State barge canal answers the purposes for which the St. Lawrence plan is designed, and that the expense of canalization of the river alone would be $500,000,000, and that the deepening of the great lakes, channels and harbors would cost more than that.

Rochester Concrete Roads Crumbling

The Rochester, N. Y., Geneseo-Mount Morris Highway, one and a half miles long, costing $42,000, is going to pieces, and road experts declare will be in a deplorable condition and practically beyond repair in another season.

An eight-foot strip of concrete on either side of a five-foot strip of macadam was the way the road was built. At every joint the road is going to pieces notwithstanding that a preparation was placed on the joints to bind the sections together. The road has been used less than a year. The best roads around Rochester have been found to be those with a concrete foundation, and an asphalt preparation top.

Oregon Dealers Perfect Permanent Organization

PORTLAND, June 21.—Following a preliminary meeting held at Eugene, Ore., April 15th, permanent organization of the automotive trade in Oregon under the name of the Oregon Automotive Dealers' Association was perfected today at Portland, with nearly one hundred delegates present from all parts of the state. W. A. Johnston of The Dalles, Ore., was elected president of the new organization and the other officers were named as follows:

Officers of the New Oregon Automotive Dealers' Association

Upper row, left to right: Robert Magner, secretary; Homer Ross, vice-president; Mark Cameron, director; George E. Halvorsen, temporary secretary; C. M. Hobart, director. Lower row: H. H. Eling, director; E. C. Simmons, treasurer; W. A. Johnston, president; A. S. Robinson, vice-president; O. B. Mount, vice-president.

Vice-presidents, Homer Ross, McMinnville; Sherman Lovell, Astoria; A. S. Robinson, Portland; O. B. Mount, Baker. E. C. Simmons, of Eugene, was named treasurer and Messrs. H. H. Eling, of Portland; Mark Cameron, of Hood River, and C. L. Hobart, of Grant's Pass, were elected directors, one each from the several congressional districts. Robert Magner, former field organizer for the N. A. D. A., was elected secretary at a salary of $300 per month.

At the Eugene meeting of the trade a constitution and by-laws committee consisting of Messrs. H. H. Eling, E. C. Simmons, M. A. Rickard, A. H. Brown and George E. Halvorsen was appointed and they submitted a report which was accepted in full. Under the present plan car, truck, tractor and aeroplane dealer members taken in automatically become members of the National Automobile Dealers' Association, their dues being paid out of their dues to the Oregon organization, which will be $30 per year. Non-dealer members, those who handle accessories, who run repair shops and garages, etc., will pay $20 per year.

President Johnston presided as temporary chairman when the meeting was called to order in the Portland Chamber of Commerce. The plan of organization was outlined by Robert Magner, who had worked hard throughout the state in awakening interest in the association as Field Organizer for the N. A. D. A., which lent every assistance possible toward the formation of the new organization. A. V. Comings, of the Chilton Company, outlined the splendid work being done in various states all over the country in organizing the trade for betterment of the industry in general and gave the delegates much information that will be of value to them in pushing the work throughout Oregon.

M. O. Wilkins, president of the Motor Car Dealers' Assn. of Portland, who worked hard to make the state organization a success, told of what had been accomplished in combatting the gasoline shortage, and there were short talks by other prominent dealers present.

The new association will put on an active campaign for members immediately and as Secretary Magner has had much experience along this line a rapid growth may be expected. The organization will be particularly careful to combat inimical legislation during the coming year, as Oregon lawmakers plan a raid on the industry similar to the legislators of other states.

Columbia "Motorize the Farm" Tour

COLUMBIA, S. C., June 21.—The "Motorize the Farm" Tour, held out of Columbia, S. C., left this place Monday morning, June 14, covered a distance of about 200 miles, held meetings and demonstrations in fifteen towns of the best agricultural section of the State, and returned to Columbia Friday afternoon, June 18.

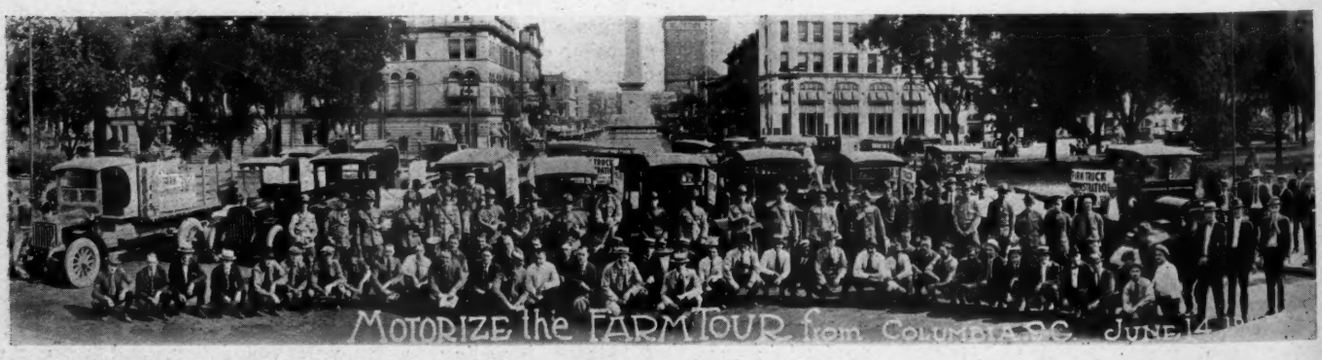
The Columbia tour is the biggest held in the Southern district thus far, both in respect to the number of entries and the work accomplished.

Twenty-five trucks and two touring cars composed the motorcade. Fourteen truck dealers of the city were represented. One Navy truck and four Army trucks from Camp Jackson made the tour, the Army trucks carrying an Army band of twenty pieces. The Navy truck carried a moving picture machine, furnished by the Carolina Theatre Supply Company, and fourteen reels of pictures, including the Northwestern Truck Tour films. A Delco Lighting Plant furnished the power for the pictures. A 3-ton Republic truck carried a Vaile-Kimes water plant and a Lalley lighting plant, which was used for illumination purposes at night. The Stewart truck carried a New Britain tractor, the demonstration work of which attracted unusual attention among the farmers en route.

Eighty-five men made up the personnel of the tour. E. A. Jenkins, Republic truck distributor, acted as train commander, assisted by L. A. Barrow, Superior truck dealer, and Sergeant J. E. Sullivan, U. S. Army. Among those who made the trip was Major N. W. Chambers, of Camp Jackson, and J. H. Widerman, Government representative U. S. Treasury Department.

During the five days of the tour, 142 demonstrations were given. In most of the towns all the trucks were kept busy, and in some places the request for demonstration hauls were more numerous than time and the number of trucks permitted. The hauling consisted mostly of lumber, fertilizer, hay, sacked grain and sheaf grain, many acres of which the trucks transferred from field to barn.

The attendance at the meetings ranged from 200 at our smallest stops to 2500 at the night-control meetings, where the crowds were attracted by the band concert, moving pictures, dancing and speech-making.

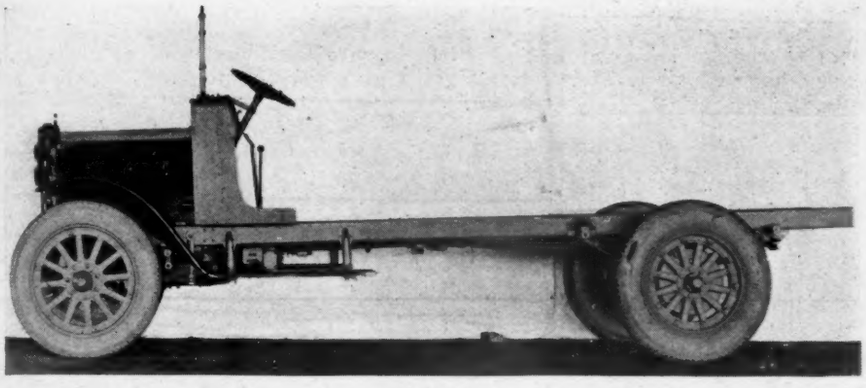


The Personnel of the "Motorize the Farm" Tour Held Out of Columbia, South Carolina, Consisted of Eighty-Five Men

NEW COMMERCIAL CARS

New Duplex Limited is of Medium Capacity

THE Duplex Limited, a medium capacity truck, and the latest addition to the Duplex line recently announced by the Duplex Truck Co., Lansing, Mich., is essentially built for pneumatic tires. It is completely equipped and built for hauling average loads of from 3000 to 5000 lb. including the body weight. To meet the requirements demanded by travel over hills, by-



Side View of the Recently Announced Pneumatic-Equipped Duplex Limited

ways, sand and mud, as well as concrete and gravel, many of the good features and lines of construction, that is said to have established the service record and reputation of the heavy-duty four-wheel-drive Duplex, are maintained in the new Duplex Limited. The speed of this model is obtained through motor power and not by low gear ratio. However, the gear ratio on high is in keeping with the motor power and the maximum speed of this job. In heavy traffic it can be idled to 5 m.p.h. on high, and with quick acceleration to 25 or 30 m.p.h.

The engine is a four-cylinder, L-head type Hinkley with a bore and stroke of 4 and 5¼ in., respectively. The cylinder heads are cast in pairs and can be easily detached for valve grinding or to remove carbon. This engine has an N. A. C. C. rating of 25.6 hp. and a brake hp. of 42 at 1600 r.p.m The piston displacement is 264 cu. in. Ample water jacketing, having a capacity of two and half gal., completely surrounds each cylinder and valve seat. The chrome-nickel steel, drop-forged crankshaft rotates in three liberal sized bearings, which are easily adjusted to the following dimensions: Front 2⅛ x 2½ in., center 2¼ x 3 in., and rear 2¼ x 3 in. The engine bearings are oiled by the force-feed and splash system of lubrication.

The ignition system includes an Atwater-Kent battery, a Westinghouse 6-8 volt, two-unit system with 157 ampere-hour battery, provides power for electric starting and lighting. Specially designed lighting and ignition switches are used with the extra feature of unusual accessibility to the fuse box. The starting motor and generator are mounted on the right side of the engine. All wiring is armored insulated throughout.

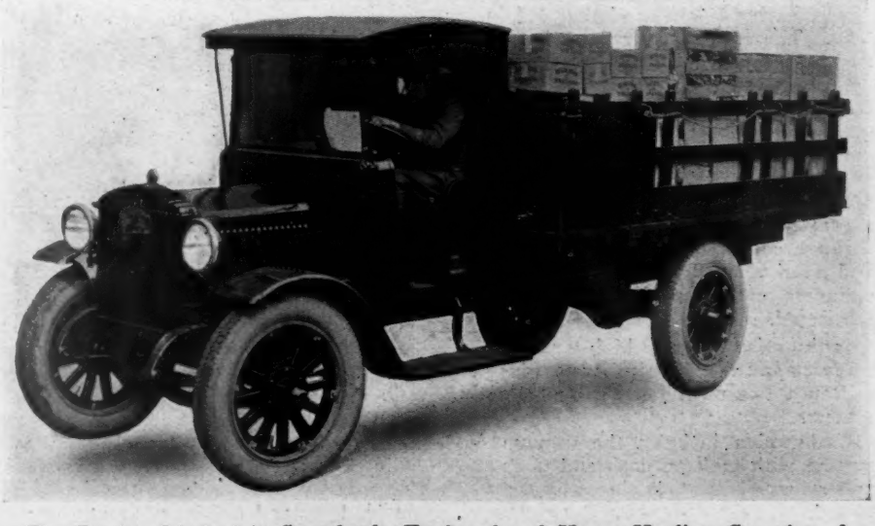
Fuel is led from an 18-gal. tank located within the cowl, by gravity through a short feed line to a 1¼-in. Stromberg carburetor. The gasoline gage and filler cap of the tank are interchangeable, thus permitting the tank to be filled from either side of the truck. A special non-splash system is constructed in the filler cap to prevent any leakage from the vent hole.

The cooling system includes a centrifugal water pump. The radiator is a Duplex with Modine spirex core, supported in finned head tanks, and providing a frontal area of 490 sq. in. The top, bottom and sides of the radiator are so assembled around the core that they form a shroud for an 18-in. four-blade fan mounted on Hyatt roller bearings and driven by a 2-in. leather belt. A provision for absorbing distortion between the radiator and the dash caused by road conditions, is made by four springs, which support the radiator, making possible a movement of ¼ in. in any direction without contact.

From the engine the power is transmitted through a multiple-disk dry-plate clutch to a selective sliding-gear type transmission. The alloy steel gears of this transmission are 6 to 8 pitch. The alloy steel, heat-treated shafts are carried on Hess-Bright Monarch and S. K. F. ball bearings. Three speeds forward and one reverse are provided. The gear ratios are as follows: First, 3.66 to 1; second, 1.91 to 1; third, 1.00 to 1, and reverse, 4.46 to 1. Peters one-piece, four-arm spider type universal joints are used. The spider center is a reservoir for the lubricant. When in motion the lubricant is thrown by centrifugal force through the center of the four arms to the bearing surfaces. One filling is said to be sufficient for 3000 miles of travel.

Final drive is through a Selden, semi-floating, worm-gear rear axle, enclosed in a one-piece malleable steel housing.

The worm and worm-gear differential are mounted on Hess-Bright Monarch bearings and are assembled as a unit on the carrier which can be easily removed



The Duplex Limited is Completely Equipped and Has a Hauling Capacity of From Three Thousand to Five Thousand Pounds

for inspection or adjustment. It provides a gear ratio of 5.5 to 1.

Both emergency and service brakes are of the internal expanding type on rear wheel drums.

The frame is of pressed steel, carbon alloy, channel section, reinforced by cross members of the same material. The cross members are rigidly secured to the side legs of the frame by large gusset plates, making for a strong and flexible assembly. The frame is carried on semi-elliptic, chrome vanadium steel springs, measuring 38 in. long and 2½ in. wide, consisting of 9 leaves in the front, and 48 in. long, 2½ in. wide, numbering 12 leaves in the rear. The spring eye bushings and pins are the same size for all four springs, thus making them interchangeable.

The front axle is of drop-forged, alloy steel of the conventional I-beam section.

Steering is through a Ross irreversible worm and nut type steering gear, with spark and throttle mounted on the steering wheel. The foot accelerator is at the right of the steering column.

The heavy wood artillery type wheels are equipped with 35 x 5 and 38 x 7 pneumatic cord tires for front and rear, respectively. The wheelbase is 145 in. and the tread is 56 in. front and 58 in. rear.

The standard equipment consists of windshield, electric starting and lighting system, ammeter, Boyce motometer, speedometer, electric horn, tools, jack, rim wrench, front fenders, Alemite high pressure lubricating system, and driver's seat. A power tire pump is provided at extra cost.

Grant Speed Truck is Pneumatic Equipped

THE Grant Motor Car Corp., Colt & Kirby Ave., Cleveland, Ohio, recently announced a new 1½-ton model, known as Medel 17, which is said to incorporate new standards in truck design, brought about by exhaustive research work. This truck is built around the idea of less truck-weight and greater pay-load capacity. One of the most prominent means employed by this company, for reducing the truck weight, is the utilization of pneumatic tires which not only have a great cushioning effect, but also eliminate the need of excess frame work necessary when solids are used. This truck is built essentially for pneumatic tires.

This new Grant chassis is equipped with magneto ignition and an electric starting and lighting system includes a spot light, head light and tail light. Other equipment includes bumper, windshield, motometer, speedometer and a power-driven tire pump. Four speeds are provided, although third speed, which is direct drive, is considered most effective under heavy loads. For partial loads or for full loads on good pavement, fourth speed, which permits a speed of up to 30 m.p.h., is recommended.

The engine is a four-cylinder Continental Red Seal, cast in block with a bore-stroke of 3¾ and 5 in., respectively. It has a rating of 35 hp. The piston displacement is 220 cu. in. The three-bearing crankshaft is of drop-forged, heat-treated steel. The front crankshaft bearing measures 2 3-16 in. by 2⅞ in., center 2 7-32 in. by 2½ in., and rear 2½ in. by 3 in. The truck is governed to a maximum speed of 30 m.p.h. by a Pierce centrifugal type governor which is set at the factory. As the governor is positive gear driven from the propeller shaft, it controls the vehicle speed instead of the engine speed. Force feed and splash system of lubrication is employed with horizontal plunger pump, which delivers oil through copper tubes to the timing gears and rear main bearings. The pistons, cylinders and connecting rods are splash lubricated.

Ignition is through a high-tension Dixie magneto and the electrical system includes a Remy two-unit starting and lighting system.

Carburetion includes the vacuum feed system with tank on dash and main tank under driver's seat, having a capacity of 20 gal.

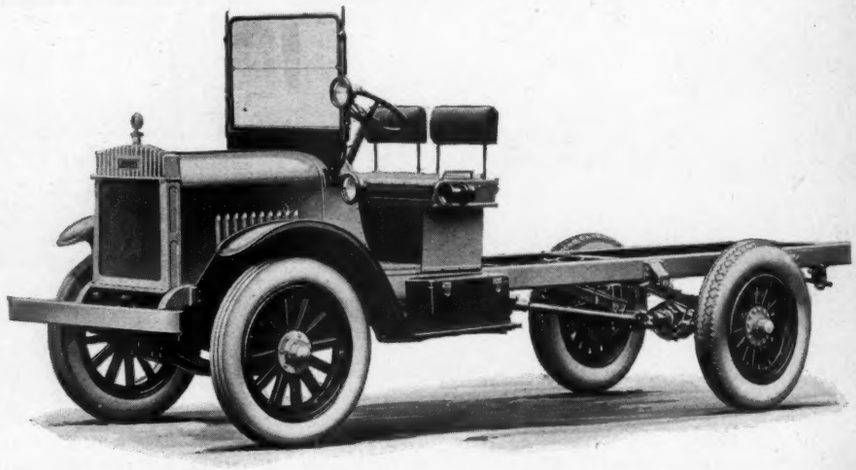
Power is transmitted from the engine through a Brown-Lipe multiple disk clutch fully housed and protected, to a Brown-Lipe selective sliding gear transmission, which provides four speeds forward and one reverse, direct being on third. The gears and shafts of this unit are of alloy nickel steel.

From the transmission the power is carried through a straight line drive equipped with universal joints to a Torbensen internal gear and rear axle. The load is carried on the drop-forged I-beam of this axle, and transmitted to the wheels through heavy duty roller bearings. The special heat-treated alloy steel gears are fully enclosed by the axle housing.

The brakes are of the internal-expanding and external-contracting type, acting on brake drums 12 in. diam. and 2 in. wide. These brakes are provided with convenient adjustments and operate through an equalizer to insure same braking action on both wheels.

The pressed steel frame with channel section 5 in. deep has flanges varying from 2 in. wide at the minimum load point to 4 in. wide at the maximum load point. It is reinforced with cross members and gusset plates, and the brackets and spring hangers are hot riveted. The width of the frame is 35⅛ in. The frame is suspended on four semi-elliptic, vanadium, heat-treated steel springs 42 in. long and 2¼ in. wide at the front, and 50 in. long and 2¼ in. wide at the rear. The spring eyes are bushed, and the shackle bolts are hardened and ground.

Steering is through a heavy truck-type worm and nut Jacox steering gear. A power-driven tire pump is included as an essential unit on this pneumatic equipped truck. It is mounted on and driven from the transmission. The pump operating lever is conveniently located and the hose connection is made outside of the frame at a convenient point. A long hose with pressure gage attached is included in the tool box equipment.



This One and a Half Ton, Model 17 Grant Speed Truck is Completely Equipped With Every Essential Accessory

The standard equipment includes two-unit starting and lighting system, front, tail and spot lights, driver's seat, rain vision windshield, bumper, dash and instrument board assembly, tool kit, license bracket, front fenders, power tire pump, tire pump hose and gage, motometer and speedometer.

England Opposes Left-Hand Drive

Decided opposition has developed in England to left-hand drive cars, and numerous accidents have been attributed to this kind of drive. Legal action may be taken to prevent further introduction of such cars, and the converting of present drives to the right-hand side. Newspapers foster the change, and the contention is that left-hand drivers cannot signal traffic behind him with sufficient certainty.

Cook Trucks and Trailers Have Telescoping Main Frames

THE Cook Motors Corp., which was recently organized under the corporation laws of the State of Illinois, with general offices and plant at Kankakee, Ill., is manufacturing a line of trucks and trailers that have a number of special features and advantages.

The most prominent feature is the telescoping character of the main frame, which is so arranged that the length of the frame can be readily and quickly changed from a short wheelbase of about 96 in. to a maximum wheelbase of about 184 in. Intermediate lengths between the two extremes can also be readily obtained, as the frames have bolt holes for adjustment arranged along the entire length of the frame at regular intervals. This construction also results in a more rigid reinforced construction as one member telescopes within the other. The frames are thoroughly riveted and made sturdy by ample cross members. The smaller forward frame which is mounted within the main load-carrying frame by specially constructed cantilever springs, carries the engine, transmission and cab. These springs which also connect the main frame are so constructed and attached as to guard against any twisting or straining of the frames, thereby reducing side-thrust.

A four-cylinder Hercules Model CU-3 engine cast in block, suspended from 3 points and which has a bore and stroke of 4 and 5⅛ in., respectively, is employed. It has an S. A. E. rating of 25.6 hp. and when operating at a normal speed of 1600 r.p.m. it is said to develop 39.2 hp. This engine has a piston displacement of 257.6 cu. in. The crankshaft rotates in five liberal sized bearings, making for smooth and firm operation. Lubrication is through a positive force-feed oiling system. Ignition is through a high-tension, Berling magneto. Fuel is led from a specially constructed gasoline tank having a capacity of 20 gal., located under the driver's seat, through a Stromberg automatic float feed carburetor with a 1¼ in. opening. This carbureter has a special bypass for idling speeds.

The cooling fluid is circulated by a motor-driven pump through an oversize vertical tube radiator. Cooling air is drawn through the radiator by an 18-in. fan.

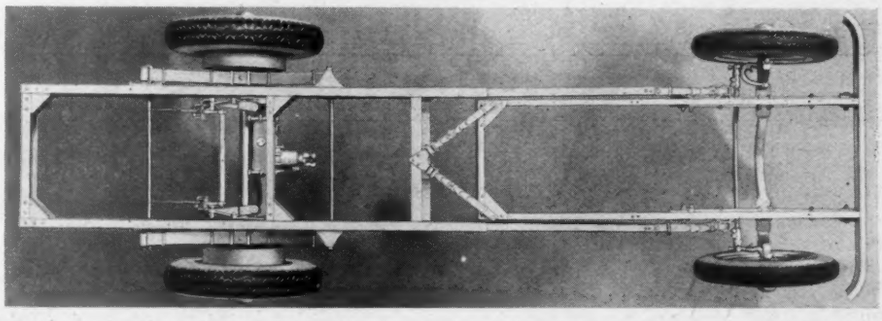
Power is transmitted from the engine through a Borg & Beck 12-in. dry-plate, multiple-disk clutch to a Cotta constant mesh transmission. This transmission is operated by dog clutches and the alloy steel gears which are of 1-in. face and 5½-7½ pitch are mounted on roller bearings. It provides four speeds forward and one reverse, which range from 4 to 30 m.p.h. From the transmission the power is transmitted through a 2½-in. tubular propeller shaft, equipped with improved universal joints having oversize bearing areas to a Kennedy internal-gear-rear-axle, which has a final gear reduction of 8.3 to 1. The lubricant in this axle flows from wheel to wheel. Double internal expanding brakes, having a special control giving double capacity and perfect equalization on the wheels are employed.

Steering is through a Lavine worm and split nut irreversible type steering gear, mounted on the left side with center control, throttle and spark levers on the steering post. The steering wheel is 18 in. in diam.

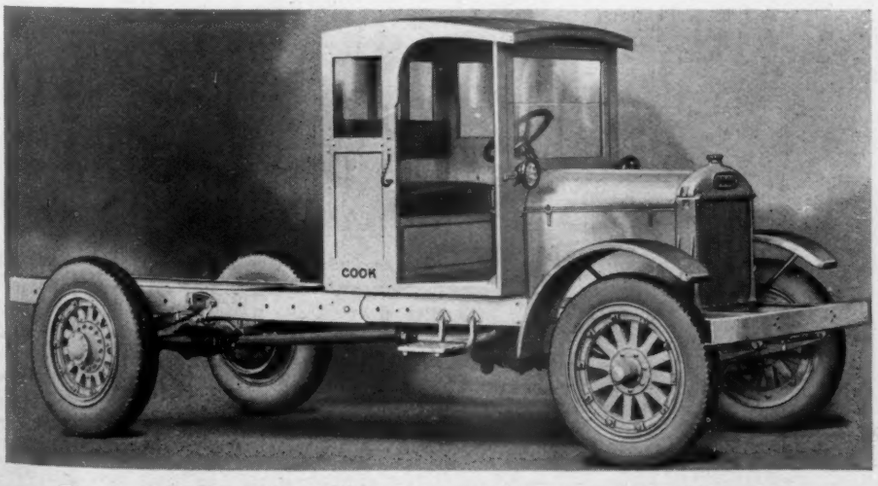
The front axle is a Shuler of the conventional I-beam section using Timken bearings in its construction and provides a 56-in. tread. The frame is of double pressed steel 4½ in. deep. The front and rear springs are of the semi-elliptic type, measuring 2½ x 40 in. and consisting of 9 leaves in the front, and 3 x 48 in. consisting of 12 leaves in the rear. The sub-frame spring is of the cantilever type, 1¾ x 18 in. and consists of 7 leaves.

The 12-spoke artillery type wood wheels are used in the front and 14-spoke of the same make and design are used in the rear. These wheels are equipped with pneumatic Firestone Giant Cord tires, 36 x 6 in the front, and 38 x 7 in the rear. The semi-enclosed 2-man seat cab, equipped with lazyback, is well built and complete in every respect.

The standard equipment includes an explosion whistle, tool kit, Rees jack, and side and tail lights. The price is $3000 f.o.b. Kankakee, Ill.



Showing the Telescoping Main Frames Which Permit of Adjustable Wheelbases



The Cook Truck is Pneumatic-Equipped and Has a Variable Wheelbase
Note holes in frame spaced at regular intervals for securing the telescoping frames

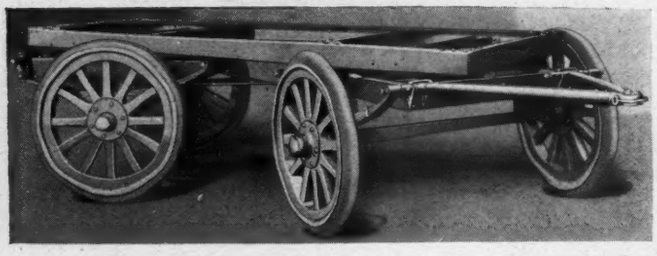
Cook Two-Ton Tracking Trailer

The Cook 2-ton, four-wheel trailer is of sturdy reinforced construction throughout and steers on all four wheels by the use of front and rear fifth wheels mounted on rollers. This is said to enable the trailer to pull easy and follow exactly the tracks of the vehicle pulling it. The telescoping feature incorporated in the Cook truck, which permits of variable wheelbases, can also be obtained in this trailer.

The main frame is of heavy 4-in, pressed steel channel with six 4-in. cross members, and reinforced by double gusset plates. The sub-frame is also of 4-in. pressed steel channel with three 4-in. cross members and reinforced by double gusset plates. The frame is mounted on 4 semi-elliptic springs, 2½ in. wide and 40 in. long and consisting of 8 leaves. They have hardened steel bushings in the ends. The spring shackles are of heavy construction with large bearing surfaces and lubrication well provided for. The spring seat is 7 in. long. Solid bar axles, 2 3-16 in. square, made of high carbon, heat-treated steel, and equipped with heavy-duty roller bearings are used. The solid rubber tire equipped wheels are of the heavy wood artillery S. A. E. standard design, measuring 34 x 3½ in.

Both the front and rear axles are equipped with king bolts and 36-in, fifth wheels and rollers. In order to give the trailer the same turning radius and track, both

axles are interlocked. A strong coupling unit for attaching is also provided. The capacity is 4000 lb. and the price is $600 f.o.b. factory.



The Cook Trailer Also Incorporates the Adjustable Wheelbase Feature.

Steinmetz Develops New Electric Delivery Truck

THE principles involved in the power plant of the new light electric delivery truck, of 1½-ton and 1-ton capacity, to be manufactured by the Steinmetz Electric Motor Car Corp., Baltimore, Md., are revolutionary in character. They are based upon inventions and designs developed by Dr. Charles P. Steinmetz, chief consulting engineer of the General Electric Co., and Mr. Donald C. Stoppenbach, and are the result of 15 years of independent study and experimentation. From 1000 to 1500 lb. of superfluous weight is said to have been eliminated in this delivery car. In fact, a reduction has been carried on to such an extent as to bring the selling price of the ½-ton delivery truck to $2100 and the 1-ton truck to $2750. The schedule for the first year of volume production is laid out by the corporation on the basis of 1500 industrial trucks and 1000 light delivery cars.

The personnel of this new corporation is made up of prominent men. Albert J. Norton is president, J. P. Story, Jr., vice-president, and W. R. Grant, secretary and treasurer. Charles P. Steinmetz is chairman of the board, and consulting engineer, and Donald C. Stoppenbach is supervising engineer.

Dr. Steinmetz has developed a new method of motor excitation by which he combines the advantages of the series and shunt motor for vehicle propulsion to a certain extent. This system consists merely in connecting a single storage cell across the field winding of a series wound motor, floating the cell on the line. With the battery voltage and the field wiring applied, the voltage drop and the field winding at about normal load is equal to the voltage of the field storage battery, and as the two voltages balance each other, no current will float through the cell.

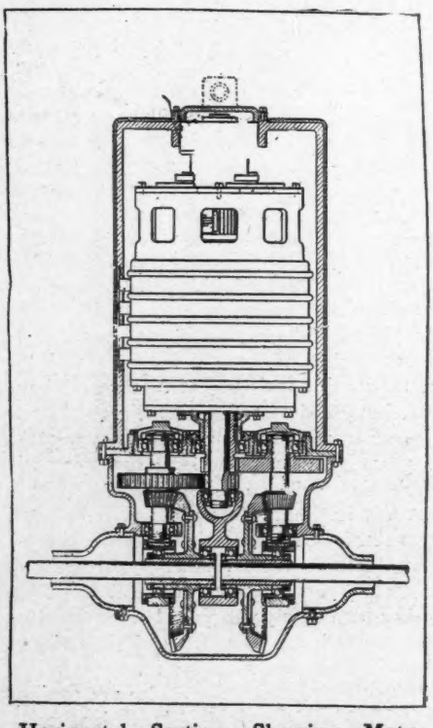
The experimental work has been done mainly on a one-half-ton delivery truck which was built in Chicago. The chassis with battery but without body weighed about 2300 lb. which is very light, as electrical vehicle weights go. It carried a 20-cell 250 ampere-hour lead storage battery of the Exide type and had an average mileage under normal road conditions of 45 to 50 miles.

Use was made of a motor having a revolving armature and a revolving field ring. The advantage of this type of motor is that substantially twice the output can be obtained from a motor of given weight and absolute speed of members, as compared with the ordinary motor with stationary field. Otherwise the motor is of conventional design, having an annular, laminated four polar field frame forming the outside member, and a drum armature forming the inside member. The commutator is of the regular cylindrical type, but the brushes are counterbalanced to overcome the effect of centrifugal force on them. There are four brushes, at quarters, opposite ones being connected together electrically.

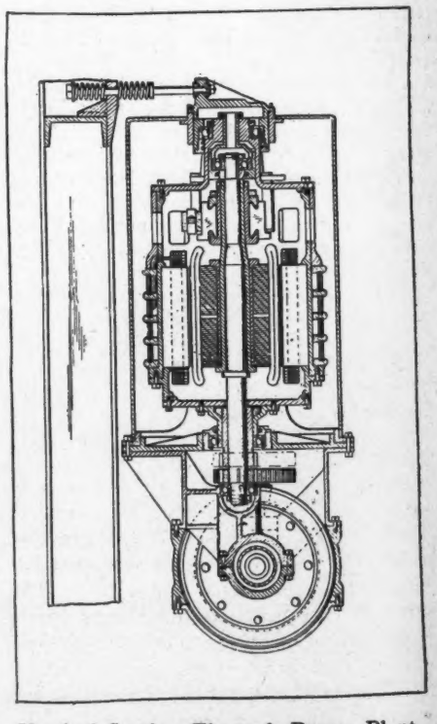
The motor is arranged with its shaft at right angles to the rear axle. To the forward side of the pressed steel axle housing is bolted a cast steel housing inclosing the reduction gears. The armature is geared to one axle shaft through a pair of spur-gears and a pair of bevel-gears, and the field frame to the other. No differential gear is required, as the torque on both field and armature naturally is always the same, therefore the same driving torque is impressed on the two road wheels. At the front of the transmission case is the motor, which is supported in bearings in a sort of spider, covered with sheet aluminum. The motor housing is spring-suspended at its forward end from the frame, and the motor and gear therefore are not absolute dead weight on the axle. There is a partition wall between the gear case and the motor housing, so that the gears can be run in oil without danger of the oil getting into the motor. Annular ball bearings are used on the shafts. Speed control is effected by connecting battery cells either all in series or in two parallel rows, respectively, and by cutting a resistance in and out with each battery combination. Thus four speeds are obtained as follows: First, battery in parallel, resistance in; second, battery in parallel, resistance out; third, battery in series, resistance in, and fourth, battery in series, resistance out. The hot riveted pressed steel channel is mounted on semi-elliptic springs of alloy steel, measuring 38 in. front and 48 in. rear.

The front axle is of the conventional drop-forged I-beam section, and the rear axle is a Steinmetz special design of pressed steel and cast steel, which encloses the motor and gears. The wheels are of the standard artillery type, equipped with pneumatic cord tires measuring 32 x 4 on all four wheels. Double internal expanding brakes are used on the rear wheels. The track is 56 in. and the wheelbase 96 to 110 in. Either standard Exide ironclad or flat plate batteries are used. The standard equipment consists of three electric lights, two dash and one tail; hub-odometer, Sangamo amp. hr. meter, switches, charging plug, necessary tools and fenders.

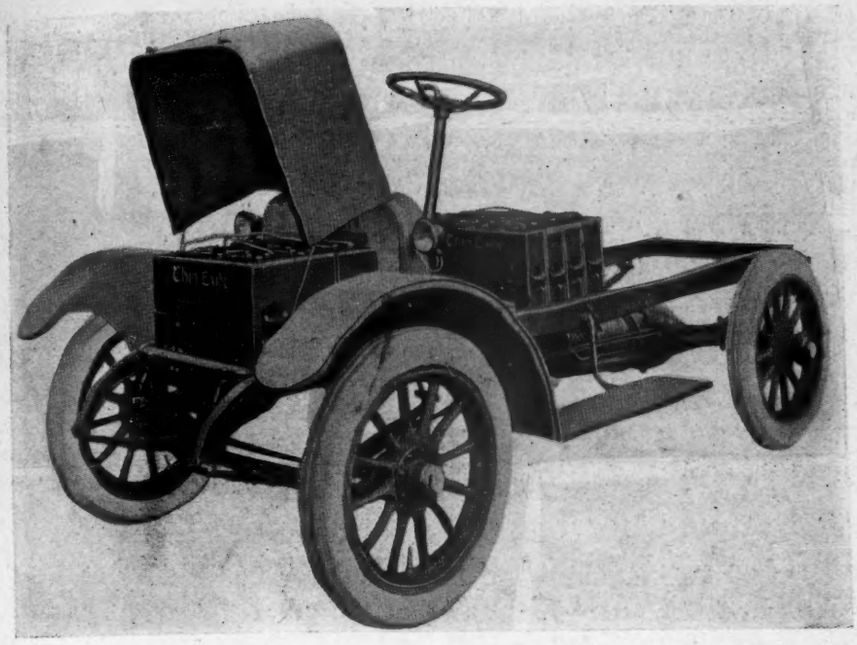
The advantages resulting from the comparatively flat motor characteristics



Horizontal Section, Showing Motor Mounting With Drive in Detail



Vertical Section Through Power Plant, Showing Motor and Drive Detail Construction



Three-Quarter Front View of the New Steinmetz Enterprise, Showing Location of Batteries Under Hood and Seat

and the recuperating action are summarized by Mr. Steinmetz as follows:

(a) The speed is well maintained on heavy upgrades and with heavy loads.

(b) A quicker and less sluggish getaway in starting.

(c) On level and slight down grades the maximum speed is limited, so that a careless driver cannot race the car.

(d) On down grades (and in stopping) the motor automatically becomes a generator, acts as brake and feeds electric current back into the battery; therefore, the car is perfectly safe when on heavy down grades, without relying on the brakes, and, indeed the brakes are used only for stopping the car, but never on down grades, as the motor checks the speed on down grades and holds it down to a safe limit. Incidentally, this saves wear on the brakes. On down grades, the car recharges the battery, thus saving the power which other cars waste in grinding up the brakes. This results in a better maintenance of the car mileage in hilly territory.

(e) Much of the power wasted in the motor field at large currents is saved, thus increasing the mileage.

The New Hall Dispatch One and a Half Ton Truck

THE Lewis-Hall Motors Corporation, of 1956 Jefferson Avenue, West, Detroit, is completing the designs for a new model, a 1½-ton worm-driven truck, which is known as the "Hall Dispatch." This high-speed vehicle will be mounted on cord pneumatic tires only 34 x 5 in. front and 38 x 7 in. rear. In other words, this new truck is to be a high-speed vehicle powered by the new type Continental Model J-4 motor of 30 H. P.

Standard units are used in the construction. The change speed mechanism is three speeds and reverse. The gear ratios are: First speed, 3.2-1; second speed, 1.87-1; third speed, 1.-1; reverse speed, 3.88-1. It will be noticed that the direct drive is high, being 1.-1. The drive is through Thermoid Hardy Joints and a sturdy tubular shaft to a Wisconsin worm-driven rear axle. This is the Wisconsin Model Eight 100 G, the worm giving a reduction of 6.2-1. The front axle is Timken 15-20.

The brake arrangement provides expanding bands on individual concentric drums. The service brake has a diameter of 12¼ in., width 2½ in., while the emergency brake operates against a 17⅞ in. diameter drum 2½ in. wide.

As usual with Hall trucks, the frame is a husky channel section hot-rolled steel construction, and is mounted on Perfection or Detroit springs, front 42 in. long by 2½ in. wide, rear 54 x 3 in. The spring shackles are fitted with cast phosphor bronze bushings and Alemite grease cups.

Steering is by a Gemmer of worm type. A Zenith carburetor is used and the trucks will be fitted with self-starters and complete electrical equipment. The radiator is of cast tank sectional construction which is original and common on all models. The cooling surface is spiral flanged copper tubes.

The seat, floor board and dash construction is most substantial; the riser of the seat, foot board and dash are all one steel unit. The seat is so placed that it gives a 9-ft. loading space back of it. The structural steel frame is a channel section, 5 in. in depth, weighing 6½ lb. per ft., and is perfectly flat on the upper side, facilitating easy body-application and removal. Left side steering is employed with the control levers at the center. The body is protected by wide flat fenders, the front ones being webbed to the frame to protect the mechanism from mud snow and ice.

The vehicle-drive type of governor is used exclusively, allowing a maximum speed of 25 m.p.h.

These trucks have a maximum capacity of 1½ tons, and are designed for speed work on pneumatic tires. A choice of any of the standard makes of cord tires is given purchasers.

Four hundred men have graduated from the Miller Tire Repair School of the Miller Rubber Co., Akron, Ohio, during the last ten months. Each man received a diploma certifying to his skill as a tire surgeon in repairing not only Miller tires, but every standard make. The four weeks' course included twenty lectures on shop management, shop plans, and sales methods, besides the practical repair work.

The Avery Company Brings Out New Pneumatic-Equipped One-Ton Truck

The Avery Co., Peoria, Ill., manufacturers of all manner of farm utilities, will augment its line to include a specially designed truck to meet the versatile requirements of farm service. The power-plant will be the same as used in the Avery six-cylinder tractor and motor cultivator. Other details relative to unit specifications have not as yet been announced. These, however, will be forthcoming this fall, as arrangements are being made for the commencement of full production at that time. The Glide plant, which is being renovated for this purpose, will be devoted exclusively to truck production.

Lone Star Brings Out One and a Half Ton Model

THE Lone Star Motor Truck & Tractor Association, San Antonio, Texas, recently announced a new 1½-ton truck, known as Model 11.

The power plant of this truck is a Gray Victory engine, suspended from 3 points. This four-cylinder engine has a removable head and a bore and stroke of 3½ x 5 in., respectively, with an A. L. A. M. rated hp. of 19.6 and brake hp. of 34.6. The piston displacement is 192.4 cu. in. The drop-forged, carbon steel crankshaft rotates in 3 liberal sized bearings, measuring 2¾ in long, front; 2 in. long, center, and 3⅜ in. long in the rear. The ⅞-in. face, timing gears are helically cut to 10 pitch. Lubrication is through a force-feed system to the three main bearings, timing gears and connecting rod troughs. The base holds 5 qt. and is equipped with a positive dial indicator oil gage. Ignition is through a Connecticut 6-volt distributor. Gasoline is fed by gravity from a 16-gal. tank, located on the dash, to a 1-in. opening Model M-1, S. A. E., horizontal type, Stromberg carburetor, attached directly to the motor. The thermo-syphon system, which has a water capacity of 8 gal., includes a vertical tube type radiator, mounted on spring pads on the frame.

From the engine the power is transmitted to a Fuller multiple-disc, dry-plate clutch to a Fuller T. U. ¾ selective sliding-gear type transmission in unit with the engine. Annular ball bearings and nickel steel gears are used in this transmission. It provides three speeds forward and one reverse. The gear reductions in the transmission are as follows: Low, 3-1; second, 1.7-1; third, 1-1, and reverse, 3.5-1.

New One and a Half Ton Model Lone Star Equipped With Stake Body

From the transmission the power is carried through a propeller shaft equipped with three universal joints, which are used between the transmission and the rear axle to the final drive, a Clark internal gear, having a final gear reduction of 8 to 1. This provides a total gear reduction and a mileage between the engine and the rear axle as follows: On low 24-1, 4.3 m.p.h.; on second 13.6-1, 7.5 m.p.h,; on third 8-1, 13 m.p.h., and reverse 28-1, 3.7 m.p.h. The semi-floating Clark rear axle is Hyatt roller bearing equipped. The housing is steel casing, the shaft alloy steel, and the differential a heavy bevel type.

The steering gear is of the screw and nut irreversible type and is mounted on the left-hand side. The hot rolled steel, 4-in. channel frame with twin frame, which is 35 in. wide at the rear axle, is supported on 4 semi-elliptic alloy steel springs, 35 in. long and 2 in. wide in the front and 46 in. long, 2¼ in. wide in the rear.

The front axle is heavy I-beam forging 1⅜ in. wide, 2⅝ in. deep. The steering knuckles and arms are of alloy steel. It provides a 56-in. standard track.

The engine control consists of a hand lever attached on top of the wheel for ignition, and another, similarly located for the carburetor.

The service foot brake is located amidship in the rear of the transmission and is 10 in. in diam, and 2½ in. wide. The emergency brake is an external contracting type on the rear wheels, contracting on 16-in. drums 3 in. wide, and is operated by a hand lever.

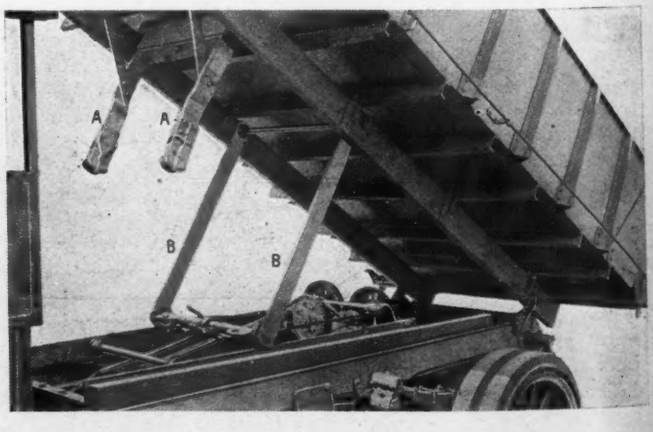
Standard S. A. E. wheels equipped with 35 x 5 pneumatics in the front and 35 x 5 pneumatics in the rear, are used. The turning radius of Model 11 is 24 ft. and the wheelbase 134½ in. The length from the back of the seat to the end of the frame is 102 in. and the weight of the chassis is 3400 lb.

The standard equipment includes two electric head lamps, one tail light, horn, jack, and complete set of tools and seats.

The Giant Easy Lift Hoist Has Many Features

THE Giant Easy Lift Hoist, manufactured by the Auto Truck Service Co., Inc., 946-948 Third St., Milwaukee, Wis., is designed for any make truck with a special Ford design. A reduction of dead-load is one of the points that was given thorough consideration in the construction of this hoist. Another feature is that the working members are mounted beneath the truck's frame, which permits the utilization of all loading space, behind the driver's cab. The lifting resistance of this hoist is also said to have been materially lowered; whereby, hoisting power and strain on the power plant is reduced and operating time lowered. The length of the hoist is the same as the length of the truck's frame not extending beyond the end of the frame. This construction means that when the truck is at its fullest height for dumping the back of the truck body is not below level of frame, thus allowing freer dumping of load and preventing the rear of truck from being buried.

Although equipped to operate by power take-off from transmission and drive shaft, the Giant Easy Lift is also provided with a crank for manual operation. Lift by hand is said to be easy, even with a full load.



Close-up of the Giant Easy Lift Hoist Mechanism.

This hoist is made by the Auto Truck Service Co., Milwaukee, Wis.

This hoist operates as follows: Two cables, erected on the cross axle, wind on two drums and raise the two forward vertical lift arms, which are indicated by the figure A in the accompanying illustration. When these lift arms have raised a load one-third its height, they reach the level of the truck frame, leaving the cable. Here two pivoted side arms, B, take the load on rails, which carry the load to the highest point. Double leverage is thus obtained with double the lifting power at half the lifting resistance. The operation of lifting can be halted at any point along its travel by a clutch and hand brake lever. When raised to its maximum point, an automatic cut-out disengages the driving clutches, retaining the load until it is ready to be lowered.

The entire action is smooth with no jerking or jarring to strain the engine or frame. All hoist requirements to meet special needs are taken care of in special designs. If a specific job is desired, it is only necessary to inform the manufacturer of the make of the truck, capacity, wheelbase, and material to be carried.

Graham Brothers' Eighteen-Passenger Speed Bus

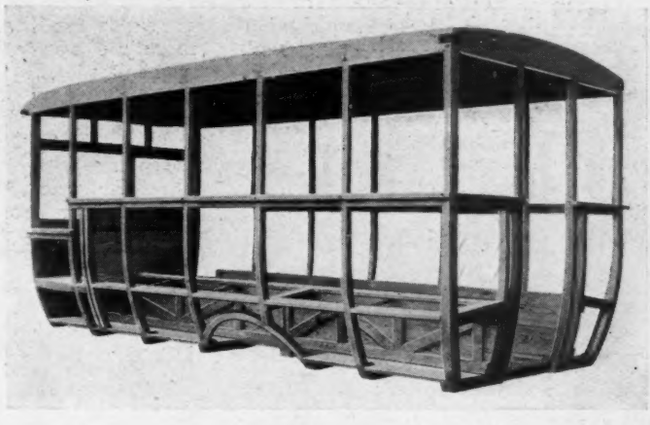
THE Graham Brothers, Evansville, Ind., have recently announced a new eighteen-passenger bus, that is not too big, heavy or expensive to operate. It is built along lines to best meet the requirements of passenger transportation. Complete comfort is afforded the passengers by the utilization of pneumatic tires and resilient springs, which greatly retard the jostling and thumping incurred when traveling over rough roads.

The Speed Bus body is 6 ft. 2 in. high on the inside, and provides an aisle 2 ft. 9 in. wide. The outside width of the body is 6 ft. 1 in., height, 6 ft. 4 in., and length, 14 ft. The spring cushioned seats, upholstered in imitation leather, are 18 in. high and 16 in. deep. The padded backs are also upholstered in imitation leather. Underneath the driver's seat a compartment is provided for battery and tools.

The vestibule door is operated by a lever from the driver's seat. This door extends to the bottom step which is 14 in. from the ground. The second step is 8½ in. high, and the floor is 8½ in. above the second step. The door is 24½ in. wide and 6 ft. 6 in. high. The rear door is 5 ft. 3 in. high, and 21 in. wide, and has an outside step. The windows consist of movable lower sashes, 26 x 16 in. and stationary upper sashes, 26 x 12 in. The electrical equipment includes four frosted glass domelights, signal buzzer and eight signal buttons conveniently located. The body parts are interchangeable, and rigidity of construction is obtained independently of the Speed truck frame. Added strength is produced in the body by the use of vertical trusses which form the seat fronts. These trusses are secured to the floor assembly by means of long through-bolts extending through the trusses and the floor sills. Each vertical rib is securely ironed to the floor and to the truss.

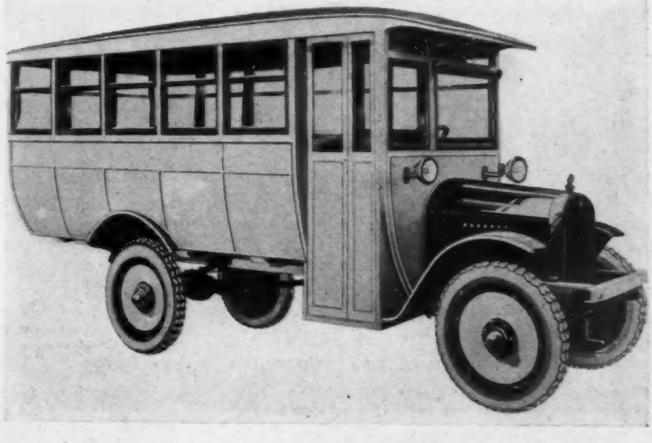
The wheel housing ribs are of oak bent to form and thoroughly ironed. The floor sills, uprights, deck ribs, door and window sashes and windshield frame are made of selected and seasoned hardwood. Three of the truss through-bolts on each side extend through angles riveted to the truck frame, thus firmly securing the bus body to the chassis.

The chassis is identical with the standard 1½-ton Speed truck chassis, including Disteel wheels, cord pneumatic tires, electric lights, magneto-generator, storage battery, engine-driven tire pump, odometer and motometer. The price is $3445, complete.

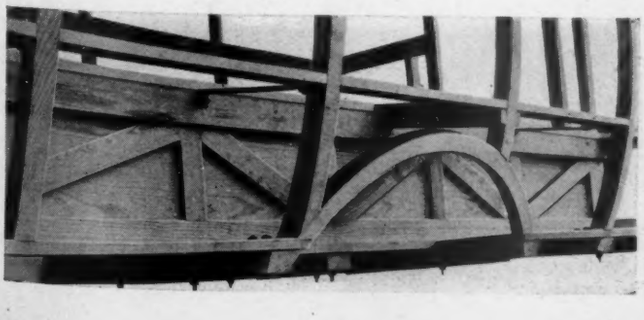


Skeleton View of the Body
The parts are interchangeable. Note the rigid truss work.

Interior View
Note upholstery, dome-lights, windows, etc.



Graham Bros. Eighteen Passenger Bus.



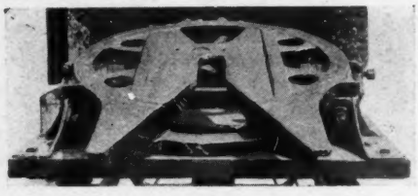
Close-up of the Speed Bus Body.

The Gardner, Mass., Chamber of Commerce is arranging to operate motor truck trains between Gardner and New York on a regular weekly schedule and will probably have the system in operation by mid-summer.

Fruehauf Automatic Fifth Wheel and Adjustable Support for Semi-Trailers

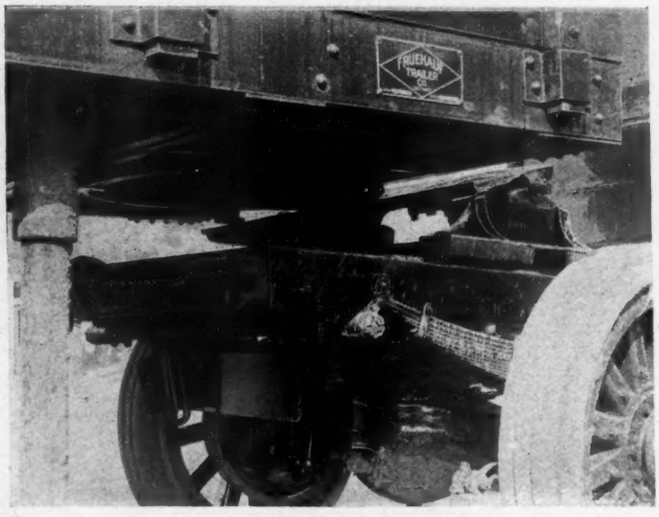
EVER since the advent of the semi-trailer efforts have been expended by trailer manufacturers to increase its efficiency by a more rapid method of changing the tractor from one unit to another, than previously employed, and eliminate the loss of time and labor required in this operation. The Fruehauf Trailer Co., Detroit, Mich., has come forward with a solution of this problem. It is producing a new and novel type of automatic fifth wheel and an adjustable support for semi-trailers These new devices are rugged and strong, yet neat in design. It is claimed that the trailer equipped with these devices can be dropped or picked up in less than a minute, doing away with all physical labor heretofore required.

The wheel of the automatic fifth wheel itself and the side members are of cast steel, strongly reinforced by extra heavy ribs that are not visible in accompanying illustration. The draught springs are mounted on a heavy steel shaft, fitted with sleeves on which the sliding carriage, supporting the wheel, operates.



Front View of the Fruehauf Automatic Fifth Wheel

The two carriages are fitted with a short shaft serving as an axis for the cast wheel, and allows for a partial rotation or rocking motion. The wheel assembly at rest forms an inclined plane at the rear of which is a "V" shaped opening, leading to the coupling device in the center. This coupling is a drop-forged lever arm pivoted at a point just off center and upon receiving the king-pin is forced into place and automatically locked by means of a dog at the outer edge of the wheel. The unit as a whole is exceedingly compact, strong and neat in its design, and weighs less than 300 lb. in 30 Model, and 250 lb. in 24-in. size.

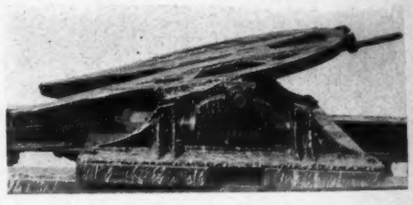


Showing the Trailer Resting on Its Supports and Tractor About to Back Under the Trailer

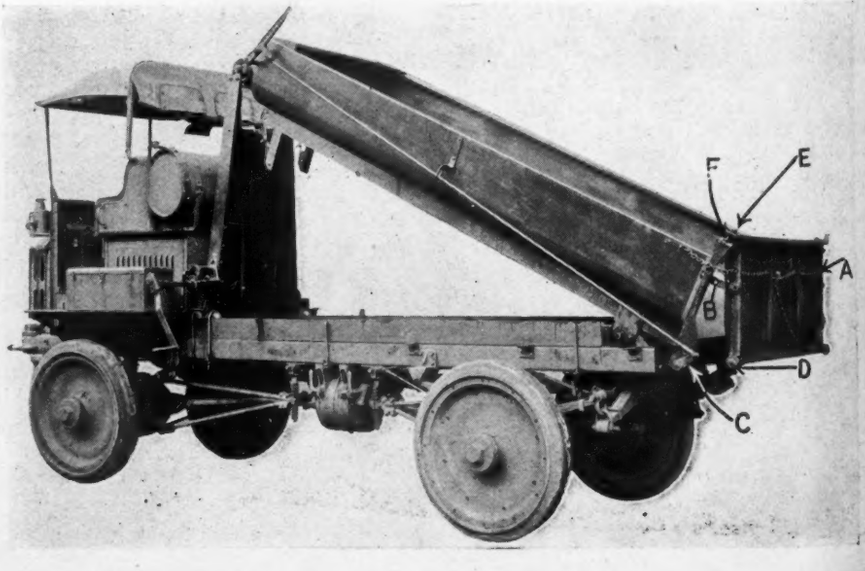
The bolster pin shown on the upper part of the semi-trailer slides into the opening shown on the fifth wheel and automatically locks in place.

The adjustable trailer supports, are likewise of original design, being constructed of tubular steel and cast steel brackets. Each leg is fitted with an adjusting screw and steel base operating on a ball and socket joint. The adjusting screws allow for a standardization of the product and enables it to meet with the varying heights of tractor-truck chassis as well as equal grade conditions at the loading point. The supports are hinged to the frame members of the semi-trailer and when not in use are drawn back into clear by means of a gear-driven screw. These gears are operated by a crank attached to the right side of the trailer frame. As a whole, the devices shown are extremely efficient and make the use of semi-trailers in rotation very efficient.

To make a connection, the tractor backs into position, picks up the semi-trailer, on the lower edge of the inclined fifth wheel, and forces it into position, automatically locking, the supports are relieved of their burden and are quickly folded into clear. The disconnection is equally as simple, once the trailer is placed in position to load or unload, the supports are lowered, the lock is opened and the tractor drives away, the entire operation being controlled by the driver of the tractor.



Sideview of the Fruehauf Automatic Fifth Wheel



Showing the Operating Principle of the Double Acting in-Gate of the Columbian Steel Dump Body

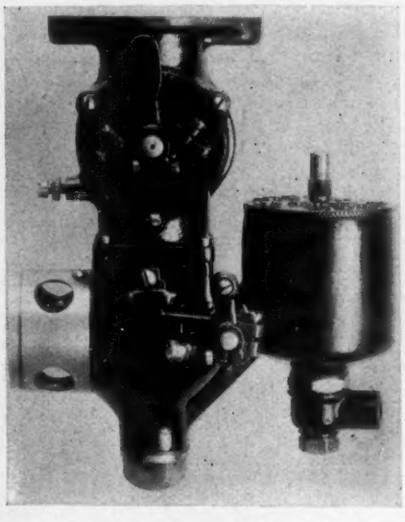
When dumping over the top of the in-gate, the latch dog, C, is held into position against the bottom gate hinge, D, and the spring cotter-pin, E, at the top is removed, enabling the gate to swing open from the top, the distance of which may be regulated by the chain, F. When dumping from the bottom, the cotter spring at the top is replaced, holding the top gate hinge rod in position and the latch dog is released, thereby permitting the gate to open at the bottom, the opening of which may be regulated for spreading purposes by the Bar, G.

TRUCK EQUIPMENT AND APPLIANCES

Claudel Carburetor Americanized

THE manufacturing center of the widely used European Claudel carburetor has been recently established in America by the Claudel Carburetor Co., Long Island City, New York. This device was designed by Charles Henri Claudel, Europe's pioneer in the development of the plain-tube type of carburetor.

The engineers of the Claudel Carburetor Co. have Americanized the European model of the Claudel to conform to the particular requirements of engineering needs in this country. They have added several features, such as a quick starting device and rapid acceleration with a cold engine.



American Claudel Carburetor
It is universal as to position and control levers

The automatic functioning of the Claudel carburetor is based upon the action of the diffusor jet assembly. This device combines three distinct principles of operation:

First—The orifice or jet which supplies all of the liquid fuel is placed at charge, or below the fuel level, where its flow is proportional to the difference in head.

Second—The diffusor proper is in "shunt" position; that is, enclosed in a chamber with openings at one end to the atmosphere and at the other end to the suction in the carburetor, thereby reducing the effect of the suction on the fuel flow.

Third—Through the nozzle holes in the diffusor head the interior emulsion chamber of the diffusor is placed under the direct action of the vacuum in the carburetor, increasing the discharge as the vacuum is increased.

The combination of these three principles of operation, correctly applied, gives a balanced mixture proportioned for the best results at every engine speed and load.

The Claudel is really a combination of two types of jet, one, the main jet, Fig. 1, of constant flow per unit of time; the other, shown as a series of nozzle holes, of suction-controlled flow. Fig. 1 indicates the fuel level when the carburetor is at rest. Fuel from the float chamber flows through the main jet into the diffusor bore. It also flows through the idling jet into the idling tube, the level in the three tubes being the same as that in the float chamber.

The Diffusor

Air at atmospheric pressure enters the outside base or air tube of the diffusor column, passes up this outer sleeve and over the top of the gasoline guard tube, which prevents the fuel from overflowing. As the throttle is opened gradually and the suction in the diffusor increases, thereby lowering the liquid level in the diffusor bore, a series of air bleed or compensating holes are progressively uncovered. Through these holes the air rushes into the ascending column of gas vapor and out the nozzle holes at the top of the diffusor in a finely broken-up gasoline emulsion. The higher the suction acting upon the diffusor, the lower will be the level of the gasoline within it, and, therefore, more of the compensating holes will be uncovered, permitting a greater dilution of the mixture.

At the higher speeds the diffusor is practically empty, and twenty-one spirally arranged air-bleed holes are in action. As the gasoline globules are lifted by the suction, they must pass through a barrage of twenty-one air guns shooting at right angles into the ascending fuel. This turbulent mixture effect produces a finely divided fuel emulsion ideal for rapid flame propagation, extreme economy and high power. The diffusor discharge is in approximately the ratio of fifteen parts of air to one part of gasoline by volume. This thorough intermixture of air and gasoline before it enters the carburetor barrel is the Claudel method of breaking up the heavy fuel of today for extreme economy.

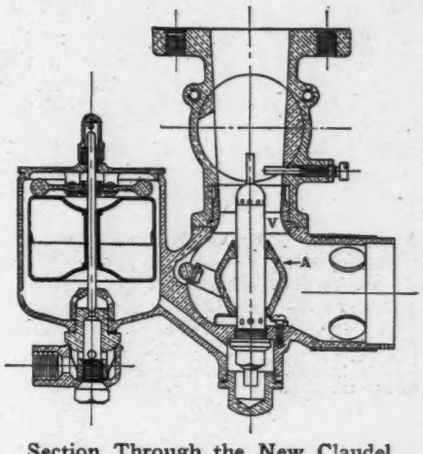
The Idling Device

The idling device is incorporated in a central tube projecting up into the depression of the barrel throttle where a strong pull is exerted on the idling jet for low-speed action. The barrel throttle is slotted to pass around the idling jet and the only adjustment on the carburetor is a screw extending into the air space to partially block off the area of this slot as desired. Screwing it in lessens the air area and enriches the idling mixture. Screwing it out makes the mixture leaner.

In the American type of Claudel a decided improvement has been incorporated for strangling the air by means of a sliding air cone, controlled from the dash. This device assures quick starting and warming up in cold weather.

In reality, the Claudel acts as a double carburetor—one of small venturi for normal driving, and, with lowered cone, another of full engine capacity.

The Claudel is a high-grade carbureting instrument built in a number of standard S. A. E. vertical sizes. A horizontal model will be announced later. Special models, however, for special installations are built to order, including airplane and duplex designs.



Section Through the New Claudel Carburetor

Puro Besto Linings

The American Republics Products Co., New York, is the manufacturer of the Puro Besto Linings. This brake lining is made of good fibre asbestos, reinforced by strong brass wire, which increases the lining's wearing and resisting qualities. The transmission lining sets are of fine quality closely woven asbestos impregnated with a special compound, and stated to be impervious to the action of heat, grease and oil. It contains no wire, eliminating all danger of short circuiting the magneto.

The Ford set consists of 3 pieces, each 23 in. long, 1½ in. wide and 5-32 in. thick, with sufficient brass rivets for attaching. Puro Besto is used for brake-lining, transmission linings for Fords, cone-clutch and disk clutch facings, asbestos spark-plug yarn and sheet packing.

Eaton Model One-Ton Bevel Gear Axle

THE Eaton Axle Co., Cleveland, Ohio, the Axle Division of Standard Parts, recently announced a new bevel gear axle specially designed for commercial cars of one-ton capacity where speed and economy are prime requisites. It is known as Model 1000. The so-called "speed wagon" has come to stay, but many car builders have been handicapped in their development of this model for lack of a suitable axle. Pneumatic tire equipment is assumed in the design of this axle, and it has been built throughout with a view to the service demands of a one-ton commercial car of today with its high torque motor.

The bevel gear was chosen by the Eaton engineers for its upkeep cost is considered lower, both from a replacement standpoint and in wear and tear on other parts, particularly the tires. Its light weight decreases the unsprung weight and adds to the life of the pneumatic tires. Finally, it is self contained and dust proof, providing a positive seal for the lubricant contained in the housing.

The axle is of the semi-floating type with the wheels fastened solidly to the drive shaft, the shaft revolving in the housing on a taper roller bearing mounted in a spider attached to the end of the housing, and securely locked in place. The inner ends of the axle shafts are splined with ten splines to engage the differential side gears, the ends of the shafts being butted together to take care of the side thrust on the rear wheels.

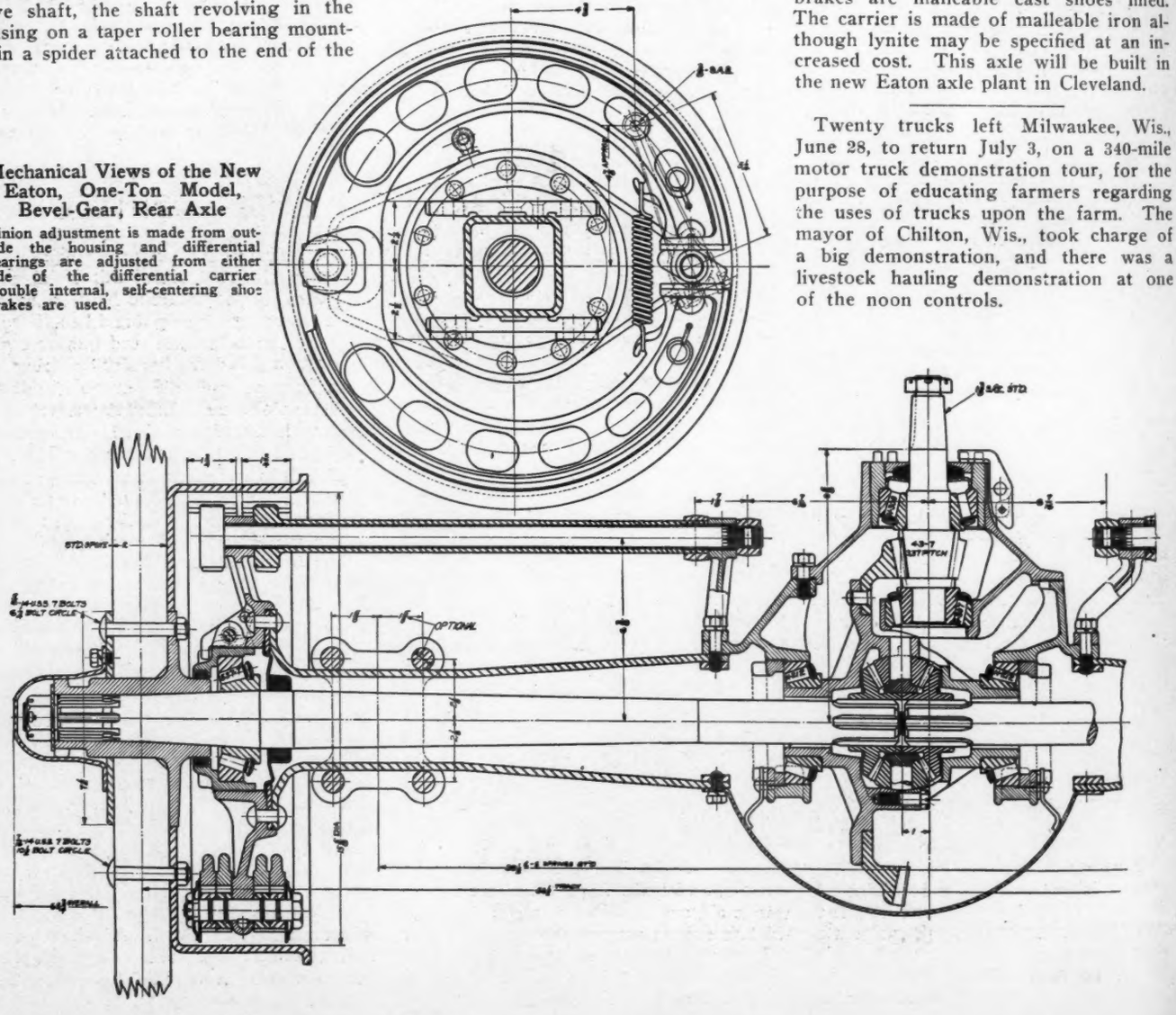
The axle housing is made of pressed steel with square sections at the spring seat locations to accommodate adjustable spring seats. It is arranged for the Hotchkiss drive to be equipped with or without radius rods. Torque arm cannot be furnished with this axle.

The carrier is in two parts, one serving as a support for the differential and differential bearings, the other part supporting the pinion and pinion bearings. The pinion bearings are mounted fore and aft of the pinion, carrying the load between the bearings instead of where both bearings are mounted forward of the pinion. This effects a decreased overhang of the carrier from the center line of the axle, more uniform loading of the pinion bearings, and a positive lubrication of both pinion bearings from the splash of the ring gear.

Provision is made for adjusting the pinion bearings from the outside of the housing, thus eliminating the risk of dirt getting into the housing when adjustments are made. Differential bearings are provided with an adjustment on either side of the differential carrier. A further improvement is a new type of locking finger for the pinion bearings. A shim adjustment of the pinion is provided, but the designers recognized here the danger prevalent on most designs of the average person changing the pinion adjustment where intending to take up the bearings, so the pinion adjustment is taken care of at the factory and is "foolproof."

Double internal self-centering shoe brakes are provided, with 16-in. pressed steel brake drums, this extra size assuring a braking surface adequate to meet the increased engine torque and higher speeds of the pneumatic tired trucks. The brakes are operated by levers located inside of the frame.

This axle is uniformly proportioned and constructed of the best grade materials. Carbon and nickel steel are employed for the gears, chrome nickel steel for the axle shafts and pressed steel for the housing and brake drums, while the brakes are malleable cast shoes lined. The carrier is made of malleable iron although lynite may be specified at an increased cost. This axle will be built in the new Eaton axle plant in Cleveland.



Mechanical Views of the New Eaton, One-Ton Model, Bevel-Gear, Rear Axle

Pinion adjustment is made from outside the housing and differential bearings are adjusted from either side of the differential carrier Double internal, self-centering shoe brakes are used.

Twenty trucks left Milwaukee, Wis., June 28, to return July 3, on a 340-mile motor truck demonstration tour, for the purpose of educating farmers regarding the uses of trucks upon the farm. The mayor of Chilton, Wis., took charge of a big demonstration, and there was a livestock hauling demonstration at one of the noon controls.

Bosch Starting Motors, Lighting Generators and Switches

As a result of elaborate experiments and tests, the American Bosch Magneto Corporation, Springfield, Mass., has developed a new line of starting and lighting equipment for automotive vehicles.

The starting motors are manufactured in two sizes, both of which may be furnished for operation with either 6- or 12-volt systems. They are designated as Type 5-M, which is the larger of the two, and has an outside diam. of 5 in., and Type 4-M, which has an outside diam. of 4 in. They are said to have a high stalling torque and can develop sufficient power with the proper factor of safety for starting any of the standard automotive engines on the market.

The field coils and armatures are carefully wound with high-grade wire and impregnated, insuring perfect insulation and mechanical strength These motors are equipped with Bendix drive, oilless, self-lubricating bearings, and are furnished for inboard or outboard operation. They can be supplied for either cradle or flange mountings in accordance with S. A. E. dimensions. The motors with these flanges are self-locating and require no support other than the flange.

The Starting Switch, which is supplied with starting motors, is operated by foot.

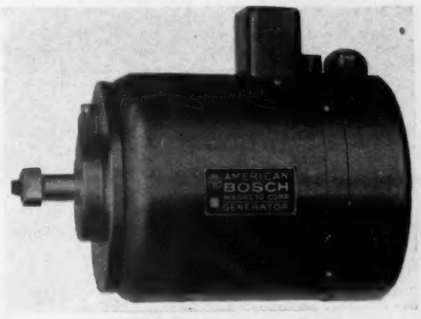
The lighting generators, which have outside diam. of the same size as the starting motors, and can also be furnished for either 6- or 12-volt operation, are made in two sizes, designated as Type 5-K and Type 4-K. These generators are of the well-known third brush type of regulation. They assure a low cut-in, speed, rapid rise to full output with increasing traveling speed, and decreased generator output with high speed driving.

These generators are of the four-pole type, wound with insulated copper wire. The armature and all other windings are thoroughly impregnated to insure insulation. The cut-out relay and field fuse are mounted on the top of the generator and are readily accessible. These two parts act as the safety-valve of the system, the cut-out relay protecting the battery from discharging when the generator is not running, and the field fuse protecting the generator windings in case of a broken battery connecting wire.

The generators are equipped with ball-bearings, drop-forge pole-shoes of liberal cross-section and pressed-steel frames. They may be had equipped with all types of flanges and shaft extensions.

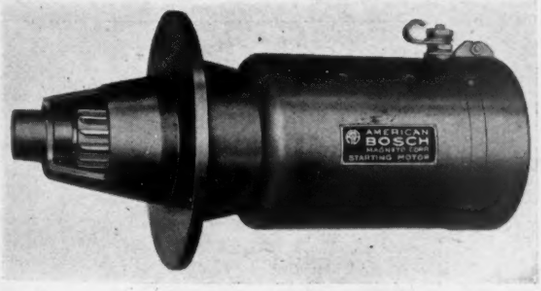
The lighting and ignition switch is mounted on an oval frame with the ammeter and dash light. This switch controls the ignition and lighting systems and is provided with a key for locking.

The Lighting and Ignition Switch is Mounted on an Oval Frame With Ammeter and Dash Light.



Bosch Type 4-K-44 Generator

It is of the well-known third-brush type of regulation and can be furnished for either 6 or 12-volt operation.



Left: Bosch Outboard Starting Motor, Type 4-M-34.

The Bosch Starting Switch is Operated by Foot Pressure.

Bosch Inboard Starting Motor, Type 4-M-22

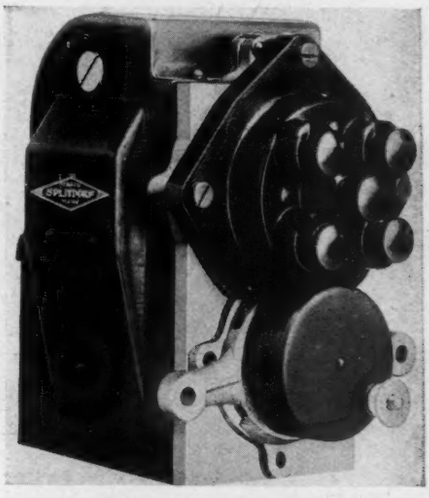
Mississippi Black Ebonite Tube

The special process used in the making of Mississippi Black Ebonite tubes is the point upon which this tube is claimed to give longer service. The Mississippi Valley Rubber Co., Iowa City, Iowa, states that this tube, even if unused for two years, will remain as soft and pliable as when it was made. In its construction Upriver Para Rubber is used. This rubber is used laminated, so as to prevent porosity. It is claimed that its peculiar composition gives it such toughness, that in case of a blowout, the hole in the tube will be no longer than the hole in the casing.

Splitdorf Four-Cylinder Five Spark Magneto

The Model 480 Splitdorf Aero magneto not only produces hot, correctly timed sparks for cylinder ignition but also extra sparks for the fuel-heating chamber. It is manufactured by the Splitdorf Electrical Co., 98 Warren St., Newark, N. J.

Only the negative sparks are utilized for cylinder ignition. A modification of the standard four-cylinder aero magneto permits it to produce four sparks per revolution instead of two, and to lead the four extra positive sparks through a fifth distributor terminal to the extra spark plug in the heating chamber. This magneto is the result of extensive field, laboratory and break-down tests. It may be furnished with or without the Splitdorf



Illustrating the New Four-Cylinder, Five-Spark Splitdorf Magneto

Enclosed Automatic Impulse Starter and is, therefore, suitable for very large heavy-duty engines.

Correction

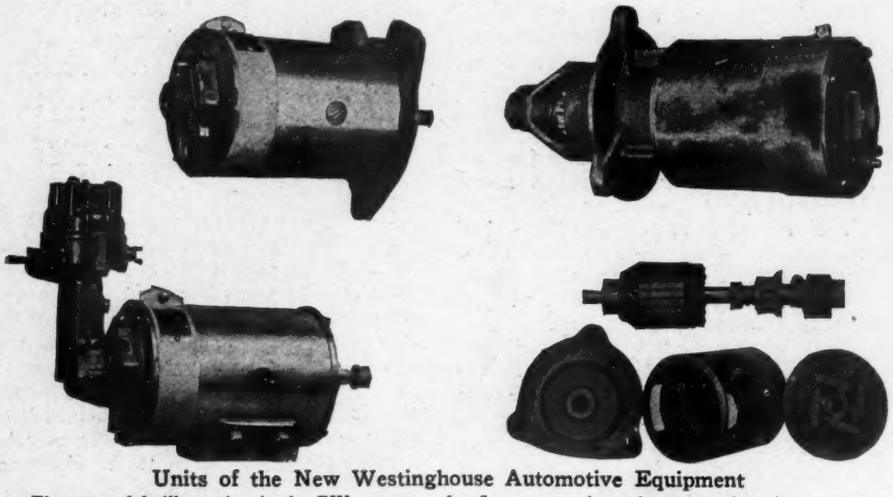
In the Truck Equipment and Appliances Department, page 47 of the June issue of the Commercial Car Journal, it was stated that the Northwind Spark Plug was manufactured by the Cammen Laboratories. This is incorrect, as it is being manufactured by the Northwind Spark Plug Corporation, with offices at 42 West 39th Street, New York City, and factory at Union Hill, N. J.

New Westinghouse Automotive Equipment

A new line of automotive starting motors and lighting generators has been developed by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. This line is supplementary, an enlargement, to the present line of machines furnished by this company.

The main features of these new motors and generators, which are known as type PW, are the construction of the frame and the commutator end-bracket. In the older type, the frame was short and the bracket cylindrical. In the new type the frame is extended and the bracket is flat; and the brushes which are mounted on the bracket, are housed within the extension of the frame. Openings in the frame, covered ordinarily by an easily removed steel band, give access to the commutator and brushes. This construction provides additional mechanical strength to the machine. The brushes and commutator are especially accessible, and the brushes can be renewed without taking off the bracket.

The generators, which are of the third-brush type, have an additional advantage in that the position of the third-brush can be adjusted from the outside without removing the bracket. This is accomplished by mounting the brush on an arm which is pivoted around the bearing housing, and is firmly held by screws on the outside of the end bracket. When these screws are loosened, the arm and brush can be turned through any desired angle. These motors can be supplied for cradle, flange or sleeve mounting, and with either inboard or outboard screw pinion shifts. The generators can be supplied for cradle, flange or foot mounting, with either ball or sleeve bearings, and with or without ignition brackets.



Units of the New Westinghouse Automotive Equipment

The upper left illustration is the PW generator for flange mounting; the upper right is the PW motor for sleeve mounting outboard pinion screw shift; the lower left, the PW generator with Westinghouse SC ignition distributor, and the lower right illustration is a disassembled view of the new PW motor for flange mounting, inboard pinion screw shift.

Davidson Piston Rings

The principle employed in the Davidson Lock Joint Piston Ring is that one member is utilized to take care of the necessary wear, while the other takes care of the tension, keeping the ring tight at all times and under all conditions, thereby making it leak-proof. It is manufactured by the Davidson Multiple Piston Ring Co., Inc., 227 West 64th St., New York.

One of the features of this ring is the fact that it is concentric. The ends of the interlocking joints hold the rings together so that when the ring is on the piston and the cylinder is placed over the piston, the rings enter the cylinder readily, owing to the usual chamber at the base of the cylinder without breaking or separating.

It is made of special pot cast gray iron, each ring concentric, each with a step joint, each ground outside to absolutely the same thickness, so as to insure even expansion and uniform tension.

These rings sell at the following prices: 2½ in. to 4½ in. x 3-16 in. x ¼ in. width, $1.25. 2½ in. to 4½ in. x 5-16 in. width, $1.50. 2½ in. to 4½ in. x ⅜ in. wide, $1.75.

The Davidson Piston Ring is a Two-Piece Design

One member bears the wear and the other provides the tension

The Portager, Vol. I, No. 1, Clyde S. Thompson, editor, published by the Portage Tire & Rubber Co., Akron, is a new house organ, and very attractive and interesting. It contains general information utility.

K-L Timer for Ford

The K-L timer, manufactured by the M-R Co., 122 N. 14th St., Lincoln, Nebr., has many new features. The inner contact points are riveted to a spring, which acts as a cushion when contact is made. This is said to prevent burning of points and also take care of misfiring in case of a worn camshaft bearing.

The contact-points are of extra large size, and made of a special alloy of metals which is stated to be equal to platinum in conductivity and that it will make a better contact. These special contact points make a hotter spark, making it easier to start the engine in cold weather. The inner contact spring support is made of cold rolled steel with a phosphorus bronze bearing shaft. This makes oiling unnecessary. The roller frame is a solid brass casting with hard fibre roller, which has a ¼ in. bearing shaft. The terminal bolts are insulated inside and outside, and have large fibre washers also special insulation between the shell and bolt, making it capable of resisting 500 volts. The list price is $7.

New K-L Timer

Note the spring arrangement of the contacts

Minuteman Tube Repair Kit

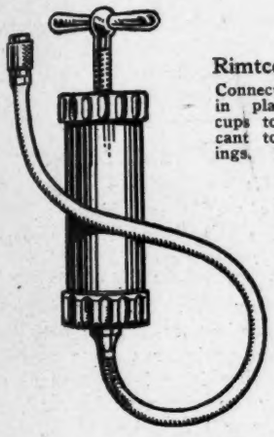
The Seal Fast Minuteman patch is stated by the manufacturer, Robert M. Bowes, Inc., Indianapolis, Ind., to be a new and scientific principle, which eliminates the use of cement, heat and gasoline.

The action of special seal fast compound when worked into the buffed surface of the inner tube, surrounding injured part, returns this surface rubber to a semi-cure, into which the Seal Fast patch welds itself by pressure, leaving no line of separation. It is stated that the friction of tire in action on the road is sufficient to revulcanize. The $1 kit contains 54 sq. in. of Seal Fast, tube of compound and buffer. $1.50 kit contains 96 sq. in. of Seal Fast, tube of compound and buffer.

An average of about thirty trucks will be exhibited at the various fairs throughout the country this year. The Illinois state fair, Springfield, is in the field with sixty-two tractors, thirty-two trucks and one hundred and five automobiles.

Rimtco High-Pressure Lubricator

The Rimtco Lubricating System, put out by The Rhode Island Machine & Tool Co., Woonsocket, R. I., incorporates a high-pressure compressor that will effectively deliver grease to all the vital parts of close-fitting bearings. The distributor of this product is Spagnolo and Storti, Island Place, Woonsocket, R. I.



Rimtco Lubricator
Connectors are used in place of grease cups to deliver lubricant to chassis bearings.

An essential feature of this outfit is the fact that this system can be immediately adopted to replace a former system as it is a simple matter to substitute the original grease cups for Rimtco ball check nipples. Still another feature of the Rimtco system is that with its equipment of nozzles this device eliminates the old style grease cups altogether. To supply the bearing with lubricant, the nozzle is slipped on to the nipple and the compressor handle is given one or two turns.

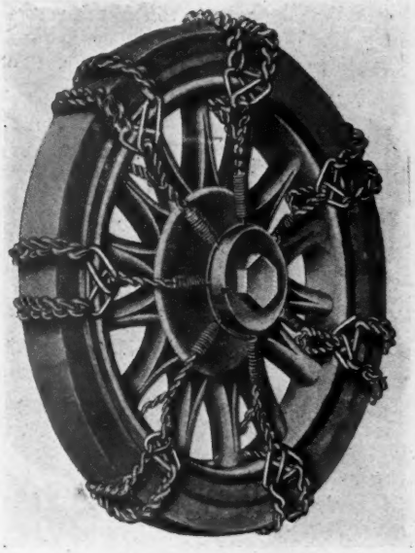
The great pressure developed by the compressor assures delivery of grease to inaccessible parts of bearing surfaces. The same pressure also forces out the old grease and leaves only the new lubricant in the bearing. The grease is delivered to the bearing clean, there being no way by which dirt or grit can enter to convert the grease into an emery-like substance, which so often hardens and injures the bearings.

The complete equipment consists of nipples, a compressor fitted with a 15-in. steel flexible hose, and a patented Rimtco nozzle. The ball-check nipples are milled and nickeled. The groove near the end is part of the holding device, which is built into the nozzle. The nozzle is made of brass, and the outer thimble is knurled. Inside, near the front, is a recess into which the two balls fall when the thimble is pushed forward. Steel springs behind the thimble force the nozzle back and the balls fit into the groove and nipple. According to the manufacturer, there isn't the slightest chance of grease leaking through when the compressor is being used. The compressors are made in three sizes, fitted with 15-in. hose. The 4-in. size holds an ample amount for average use; the larger size is for use when several cars or trucks are to be greased. The prices of complete equipment range from $7.50, depending upon the size, the car or truck to be equipped, and the quantity.

Daubenspeck Dubl-Bilt Anti-Skid Chains for Trucks

The Daubenspeck Dubl-Bilt Traction chain manufactured by the Daubenspeck Co., Butler, Pa., has many features, one of which is its single unit feature; which allows the chain to be placed on in part or as a whole in any position in which the truck nay be, without jacking up the load. Its construction is such so as to prevent the chain from rolling, locking on and cutting the tire, giving it a positive traction action.

These chains can be quickly and easily attached. The traction chain is held at each edge of the rim by a cross-welded triple eye link which lies flat on the felly and prevents the chain from rolling under



Daubenspeck Dubl-Bilt Chains for Trucks

the tire, which action would have a very detrimental effect on the tire. The traction links are drawn to just the right temper to give maximum strength and greatest possible wear.

The two 5/16 in. chains on each unit are prevented from rolling by link supporting chains on each side of the tire. Tie chains hold the ends of the traction chains tight against the tire, which in turn are attached to springs which carry half the weight of the traction chains, the other half being carried by the felly through another link of the tie chain.

The list price of these chains per set range from $14.00 to $35.00 in accordance with the size of the tire.

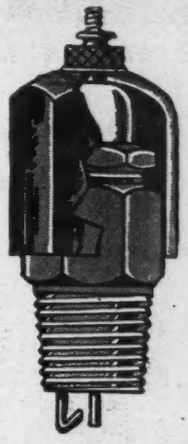
New Hooven Tubular Radiator

The Hooven Radiator Co., recently announced the commencement of production of its new tubular radiator which is the result of much experimenting and concentrated study, and which is especially designed for heavy trucks and tractors.

The company now occupies its new large factory, 410-20 N. Western Ave., Chicago, Ill., which expansion was necessitated by the need of greater production facilities.

Protexun for Spark Plugs

A device for protecting the spark plug core from becoming cracked, chipped, etc., and that eliminates temperature variations between the inner and outer ends, has been developed by Irl R. Hicks, Centralia, Mo. It is known as Protexun. This device is designed to fit over the top of the plug. This protects the top



The Protexun Spark-Plug Core Cover Attached.

from cold chilly air by providing a dead air space around the outer unprotected portion, thus keeping the top effectively heated. This device is especially valuable to cover a plug having a mica core. Although the mica core will not break as easily as porcelain, the same expanding and contracting conditions exist and at the division there is a slippage of the thin mica rings back and forth as the plug heats and cools in and out of service, thus causing carbon and oil to pass through to the electrode. Protexun is claimed by the manufacturer to offset this condition.

It sells at $.50, and is sent postpaid when ordered in quantities of four or more.

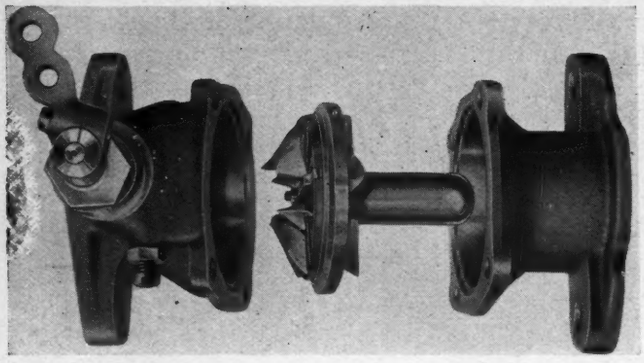
New Berdon Truck and Tractor Governor

The Berdon Manufacturing Co., 2178 E. Grand Blvd., Detroit, Mich., announces a new truck and tractor motor governor of the gas velocity type. It is especially adapted for the heavy-duty service associated with this class of engine.

It is automatic in action. The usual driving gears and shafts being eliminated. The governor possesses but one moving part, the throttle assembly, which serves both as the control and the throttle unit. This is mounted on a steel ball bearing of ample capacity, which is completely housed in and permanently lubricated.

Instead of the conventional butterfly throttle valve, an oscillating disk and grid type of throttle with four symmetrical openings is employed. This construction is claimed to insure improved distribution of the gases entering the engine manifold from the carburetor, resulting in greater economy and smoother carburetion with rapidly changing loads.

The balance and light weight of the moving element and the elimination of much friction enable the governor to



Showing the Three Fundamental Parts of the Berdon Truck and Tractor Governor.

Note the oscillating disk and grid-type throttle.

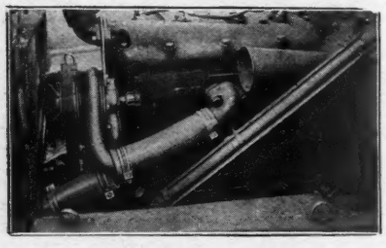
function with and compensate for the slightest change in load conditions.

The oscillating and stationary member of the throttle valve never contact while the governor is functioning, thus eliminating any tendency to stick.

Atlas Water-Circulating Pump

The Atlas Brass Foundry Co., 992 S. Front St., Columbus, Ohio, recently introduced a new circulating pump, designed specifically for the Ford.

The pump body is made of gray iron castings and the bearings are of bronze. The impeller is also made of bronze and



Close-up, Showing Atlas Centrifugal Pump Attached on a Ford Power Plant

the packing nut of yellow-brass. The impeller is securely keyed to the steel shaft with a Woodruff key and a dowel pin. Packing of a non-vulcanizing type is used. This pump can be installed without unscrewing any of the Ford mechanism, and it is stated that the complete outfit can be assembled easily.

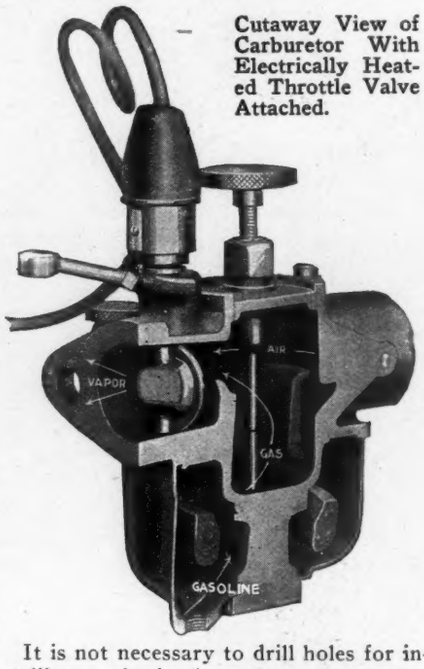
To install, the two bolts that fasten the water outlet to the cylinder jacket are taken out, the pump bracket and gasket are slipped in, the two bolts are screwed, and the water connections are fastened and slipped on the fan belt. The entire installation equipment, including copper-asbestos gasket, fan-belt, hose and fasteners, is furnished with the pump.

Each pump is packed separately in a strong neat box, accompanied by full installation directions. It sells at $12 west of the Mississippi, and $10 east.

Electrically Heated Throttle Valve

The Instant Starter Co., Inc., Kokomo, Ind., is marketing an electrically heated throttle valve.

It is placed in the carburetor, just above the spray nozzle, so that the gas vapor comes in direct contact with the heated throttle valve, changing it into a dry hot gas, thus permitting a clean, clear explosion. By the use of this device it is stated that the engine will start in the coldest weather with less cranking or use of the starter, and that it saves overworking of the storage battery, assuring less charging and longer life to the starter and generator.



Cutaway View of Carburetor With Electrically Heated Throttle Valve Attached.

It is not necessary to drill holes for installing, as it simply replaces the present dead valve. It can be installed in thirty minutes. The list price is $9, and comes complete with wire and switch.

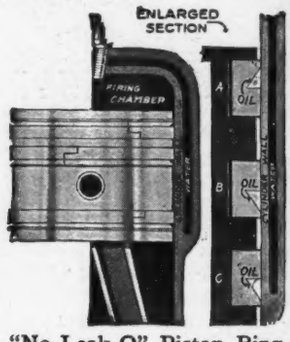
Killefer Solderless Faucet

To avoid waste and other minor annoyances in handling a large can of oil, are the reasons why the Killefer Solderless Faucet, distributed by H. R. Francis, 2834 Stephenson Ave., Los Angeles, Cal., is being popularly received by the garage owners and others. It may be satisfactorily used on thin metal containers, cans, tanks, etc., with the certainty that when connected it is entirely leak-proof.

It is applied as follows: The can is laid on the floor on its side, so that the contents will not leak when the faucet is inserted, and then the wing nut is backed away from the rubber gasket. A hole is made with a small nail where the faucet is to enter, and care should be taken that the hole is not placed too close to the edge of the can. The point of the faucet is pressed into the nail hole by bearing down with full weight and rocking back and forth sideways until the point cuts through the tin, and then it is screwed to the right into the can until the shoulder is anchored inside. The body of the faucet is held with one hand, and the wing nut is screwed tight against the rubber gasket. To detach it, the wing-nut is loosened, and by bearing down on the end of the faucet and turning backward, it comes out easily. The rubber gasket is replaced if worn or damaged by use. The hole in the gasket should be smaller than the diameter it fits.

"No-Leak-O" Piston Ring

The "No-Leak-O" piston ring, made by the No-Leak-O Piston Ring Co., Baltimore, Md., has its distinctive character featured by the groove for oil, which maintains an oil seat between the ring and the cylinder wall. This ring is made under a patented process, by which even tension on the cylinder wall is secured. The finished ring is claimed to have an equal bearing on the cylinder wall, to wear evenly, as will also the cylinder wall. All No-Leak-O rings are wrapped in oil



"No-Leak-O" Piston Ring

Showing rings assembled on piston and an enlarged section of piston and rings

paper packed one dozen to each carton, bearing the trade marks "No-Leak-O" and the "Seal in the Ring." Special sizes furnished upon application.

Wood No-Valve Grease Injector

Wood's No-Valve grease injector, manufactured by the Bennett Injector Co., Muskegon, Mich., is used for pumping heavy grease direct from the original

Wood Injector Attached to a Portable Grease Barrel

grease barrel into gear cases and transmissions. It can be quickly and simply attached to any grease barrel.

As the grease barrels can be transported to any part of a garage or factory by a special towing truck, grease wherever needed can be supplied readily and with great accuracy as the pump throws exactly ¼ lb. of grease per stroke. A special non-drip nozzle instantly stops the flow of grease when through pumping.

Jambor Timer

The Jambor Mfg. Co., Milwaukee, Wis., is offering to the trade a new Ford timer known as the "Jambor." The material from which the brush of this timer is made is claimed to resist wear to an unusual extent. What wear will take place on the segments and fibre of the case is consistent over the entire circumference. Therefore, the wear being a true concentric, eliminates the only possibility of the brush jumping, which in turn causes the engine to miss.

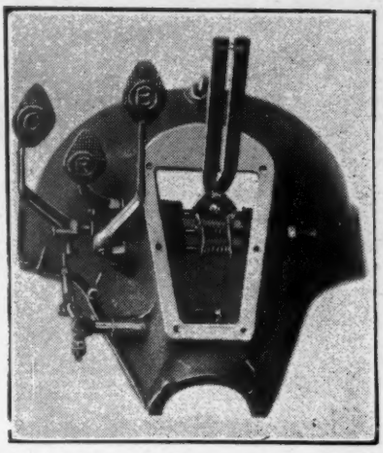
Two Units of the Jambor Timer

The commutator case of the Jambor timer is stamped from cold-rolled steel, to which are riveted in their proper places a nickle-plated bracket and oiler. Fibre rings of either red or gray color are pressed into the steel case with punch presses. The segments are stamped from hard rolled steel and assembled with the terminal screws by a special process. The segments with attached terminal screws are inserted in broached recesses in the fibre ring under pressure, and the ring and segments ground perfectly smooth. Black fibre shoulder washers insure insulation between the case and terminal. Copper-plated terminal nuts and washers complete the case. The standard design of a roller-brush familiar to Ford owners is furnished, but the new plunger type brush merits consideration.

Transmission Band Spring Compressor

A device that compresses all three springs at the same time when replacing transmission bands, and leaves a space of one in. on each of the springs, allowing ample space for slipping the bands into place, is the new product of the Roberge & Sons Mfg. Co., Dallas, Tex. It is sold by the Harry Knight Co., 805 Southwestern Life Bldg., Dallas, Tex.

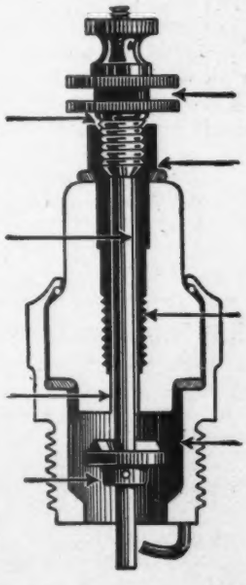
In order to get the best results when using this tool, the transmission cover is placed on the floor or work bench, the nuts on the ends of the shafts are unscrewed as far as they will go, and the springs pressed together with the compressor. The link in the top of the handle holds the tool in position while replacing the cover.



Roberge Transmission Band Spring Compressor in Position, Retaining Three Springs in Position.

Wellman Sparking Plug

The Wellman sparking plug has a priming channel which runs down through the central body, conveying the fuel direct to the spark gap. It has no petcock for this purpose. This one-piece plug is fitted with two sharp knives which removes accumulated carbon and oil from the porcelain. The one-piece full nickel electrode is constructed within an air chamber, which permits free expansion and contraction, thereby eliminating any possibility of breakage from heat or cold.



Wellman Spark Plug

It is a one-piece plug and has two knives to remove carbon deposits on porcelain. It also has a priming feature.

Because of the air chamber arrangement it is believed that the plug is practically unbreakable from sudden changes of temperature within the plug, and by means of a heavy brass reinforcing sleeve within the porcelain, danger of breakage from external blows is reduced. It is made by the Wellman-Muter Corp., of Chicago.

Majestic Tires and Inner Tubes

The new Majestic Titanium cord tire is made considerably oversize, which is said to give it longer life. It is manufactured by the Majestic Tire & Rubber Co., Indianapolis, Ind.

The design is well-balanced, making for riding comfort. The tread is tough and wear-resisting, and the bead carries a special rubber-enclosed cable, which not only makes the tire fit rigidly, but also causes an equal pressure to be exerted around the entire rim. The breaker strip is of pure rubber worked into evenly woven fabric.

The Non-Skid Tread Majestic Titanium cord tire was adopted after a careful survey of results obtained with the various tops now in use. The "club" combines the usual stud occurring in other types, but it is not detached. The "clubs" are staggered to meet the unevenness of the road without slewing or throwing the car to one side. The adjoining rib is continuous and gives long service.

New Non-Skid Tread Majestic Titanium Cord Tire.

The majestic Titanium inner tubes are constructed with thick walls and are perfectly balanced as to diameter and length. They are made in red or gray. The red tube has as its binding element pure antimony, which is stated to preserve the rubber for a long time.

Catalytic Spark Plug

The Catalytic spark plug manufactured by the Comet Tool & Mfg. Co., Chicago, Ill., is built along lines to conform to the principles involved in Catalytic construction. It was recently discovered that Catalytic flameless combustion produces sufficiently high temperature to prevent an accumulation of carbon on the lower end of the spark insulator. Advantage was taken of this new knowledge in the construction of this new plug.

The burning action, incident to the flameless combustion of this plug, is said to be carried on for a length of time covering the two strokes succeeding the moment of the explosion without interfering with the regular spark ignition. This permits the gas mixture in the vicinity of the insulator and catalytic structure to be cracked up and transformed into lighter hydrocarbons. In addition to this, the high temperature tends to burn off any carbon deposits from the lubricating oil or from any other source, upon the insulator.

SERVICE AND REPAIR DEPARTMENTS

Conducted by C. P. SHATTUCK

Dividing the Service and Sales Department

Some Reasons Why a Service Department, Conducted Independently From Sales Department is a Success. Many Good Pointers in This Article for the Dealer

SERVICING trucks by an organization separated from the sales department, or conducting a service station independently, has and is solving many of the problems pertaining to motor highway transportation service. For the past two years the L. G. Schoepflin Co., Buffalo, N. Y., has been conducting an independent service organization. Although conducted separately, L. G. Schoepflin and his son, H. C., are financially interested, being president and treasurer of the Schoepflin Auto Service Co., Inc. A. F. Baxter, vice-president, is general manager. Service is given from a separate building on Hanover St., some distance from the sales department, and three large floors are given over to truck service.

Why a Separate Company Was Formed

The decision of the Schoepflins to divorce service from sales is based on an experience in merchandising trucks that extends over a period of approximately ten years. Thus far the results have justified the experiment, if it can be termed as such. In speaking of the plan the younger Mr. Schoepflin informed the writer that it has produced greater satisfaction all around. "The customers are better satisfied," said Mr. Schoepflin, "and so are we."

He pointed out that when a truck is sold the purchaser is informed of the guarantee, the terms of free labor, etc., and that after this time has expired he must assume the responsibility of keeping the truck in condition to give satisfactory service.

After the time limit expires the customer looks to the service station for repairs which he pays for. During the guarantee period every effort is made to educate the owner to the need of inspections and adjustments, and it is also impressed upon him that when the guarantee expires that free service ends. The customer is also told that the service station is a separate organization although it bears the name of Schoepflin. As a matter of fact all work done on new chassis, such as unloading them from the cars, washing, greasing, tuning up, etc., is charged at so much an hour to the Schoepflin Co. And the company pays its bills, and in cash, as does any customer. Of course, there is a special labor rate for the sales company, it being based on cost plus overhead. The customer pays cash for all work done, and for parts.

Three Months' Free Labor.

Briefly, the sales contract which includes the service policy, comprises the usual manufacturer's guarantee, and, in addition, what amounts to three months' free labor. This provides for adjustments, inspections, etc. If, for example, bearings require taking up, the work is done at no charge to the customer. As previously stated, every effort is made to educate the driver and the owner as to the importance of periodical inspections and of giving attention to those parts requiring adjustment.

After three months the owner assumes the responsibility, for the company believes that the truck owner must eventually realize that he has a large sum of money invested in a mechanical device and that its parts must be given attention from time to time if he expects to obtain satisfactory and dependable service. In addition to the service station inspection there is a road inspector who follows up those who do not come to the station. If the driver does not respond to the educational treatment the owner is advised as to conditions.

Keeping Tabs on the Trucks.

Manager Baxter makes use of a simple card index system for maintaining a record of the trucks sold. As soon as a sale is completed the complete data is sent to the service station. A record is then started for the chassis. The data includes the name and address of purchaser, type of body, number of chassis, capacity, telephone address of owner, driver's name, if possible; and date of delivery. The name of the official of the company having charge of the truck or trucks is also listed.

A record is maintained of the history of the truck insofar as the service station is concerned so that Manager Baxter can readily determine when the guarantee period expires as well as other facts essential to avoid the possibility of the owner demanding free work or concessions. If a truck is sold by the owner or traded in to another dealer, effort is made to ascertain the new owner and he is followed

H. C. Schoepflin
Treasurer

Service Station of the Schoepflin Auto Service Co., Inc., Buffalo, N. Y.

up and given service—if he will patronize the station—which he generally does as will be explained later. In other words, it is the policy of the service station to make every effort to keep the new owner of a used truck sold on the service. This is an immense advantage to the sales organization for if the customer is satisfied with the truck, and the service, he is more receptive to the salesman's advances when the customer is in the market for a new truck.

Service for Old Trucks Featured

Manager Baxter, who is a live service head, is keen on servicing the old trucks and all sold by the sales organization. Up to within a few months ago the Schoepflin company represented a certain make, and it is said that during the period of representation that over 1000 were sold. Now taking on a new line generally results in the users of the old looking to the new dealer for service. But not in the case of the Schoepflins, for they believe that they are passing up a big bunch of good prospects by taking the attitude of "Well, we no longer represent that make. Let the other fellow who now has the agency do it, if he can. You will see the difference between real service and alleged service. You will appreciate what we did for you now," etc.

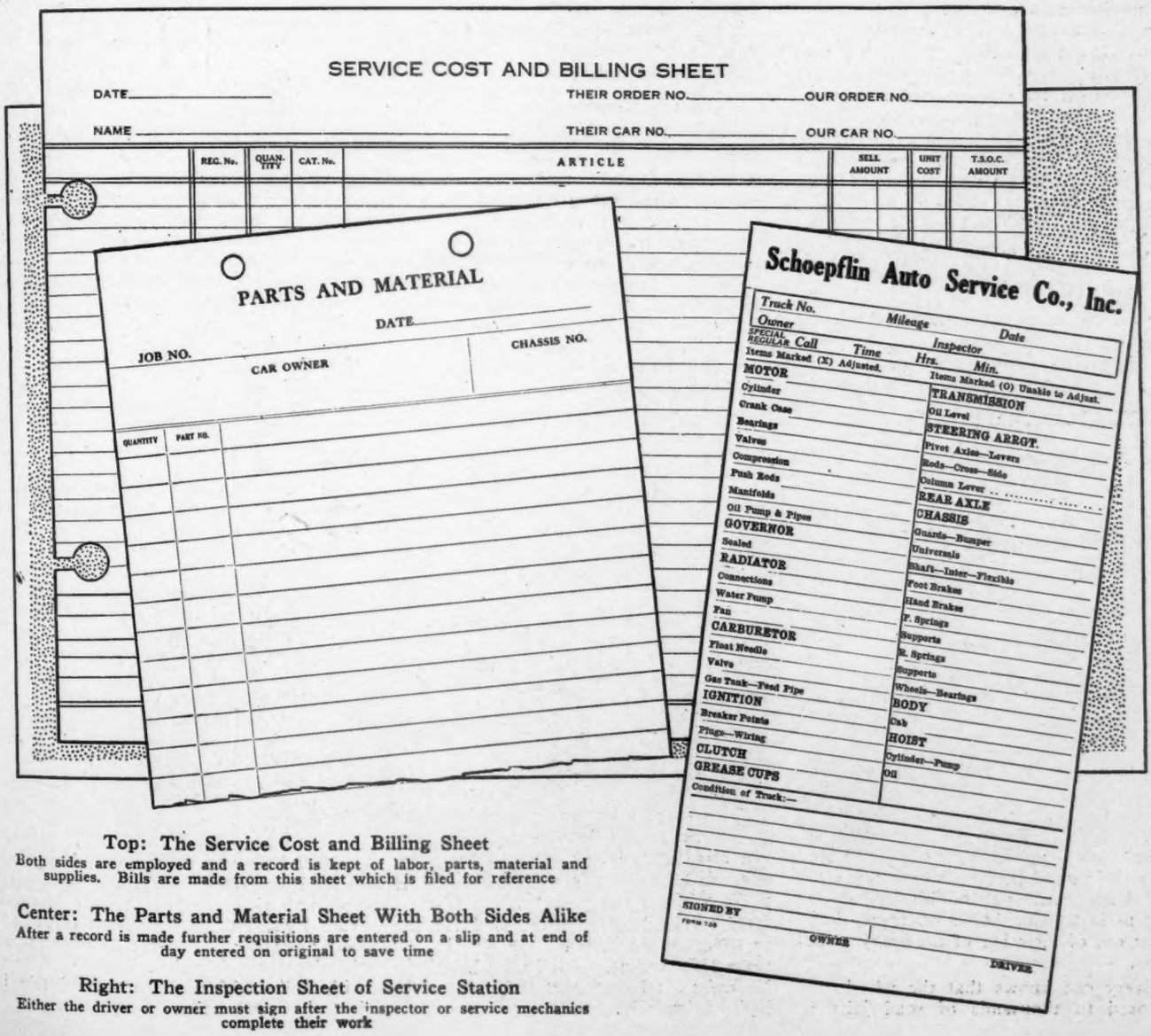
The service station is stocking a large number of parts for the discontinued line. This company believes that its corps of skilled mechanics, men entirely familiar with the old line, can give better and more efficient service than the new dealer; at least until the new agent perfects his service organization. Thereafter it becomes a question of merchandising the service, and in this respect Mr. Baxter hinted that he would take a chance of obtaining the good will of the owners.

An Advantage to the Sales Force

With all of the old trucks being cared for or a greater part of same there is every reason to believe that the policy of caring for them has many advantages—for the sales department, at least. Being in contact with the drivers, the service department should be in a position to learn if the owner contemplates making a change or adding new trucks. Of course, this information is passed along to the sales department.

The Schoeflin Service Co. moved into their new quarters recently and at the time the writer visited the station new equipment and machinery were being installed. The first floor is given over to what may be termed "quick service" or for minor adjustments and repairs. The second floor contains the manager's office and bookkeeping departments and adjacent to the latter is the stock room. There is a window cut through the partition separating the entrance to the stock room and office, and purchasers of parts must first obtain a receipted bill before parts are delivered.

The balance of the floor is given over to the repair department which is equipped to do economical work. All of the mechanics are of the all around type and have been with the company for several years. No labor troubles are being experienced by Mr. Baxter as the scale of wages is equal to that paid in the large cities. Time and labor saving equipment is supplied and among the new apparatus to be added is an overhead track with a traveling crane so that heavy units may be easily and quickly run to the various



Top: The Service Cost and Billing Sheet
Both sides are employed and a record is kept of labor, parts, material and supplies. Bills are made from this sheet which is filed for reference

Center: The Parts and Material Sheet With Both Sides Alike
After a record is made further requisitions are entered on a slip and at end of day entered on original to save time

Right: The Inspection Sheet of Service Station
Either the driver or owner must sign after the inspector or service mechanics complete their work

departments. The plans include separate departments such as engine, transmission, rear axle, etc.

Simple Shop Record System

The system employed in the service station for repairing, etc., is simple and comprises few forms. When a truck enters for repairs a service order, made in duplicate, is filled out. It bears a serial number and the usual data. The copy goes to the office and is filed. The original goes to the foreman who assigns the work. Any additional work required is entered on the original sheet which is looked after by the foreman.

A service cost and billing sheet is employed to keep a record of parts, labor, costs, etc. This sheet is a loose leaf type and records are entered on both sides. The hours of labor for an operation are entered, being obtained from the time cards, and the material and parts are also entered. From this sheet the office makes out the bill after which the sheet is filed. It bears, of course, the name of the customer and the job number. By means of this sheet a record is kept of the costs of different operations, and the data can be used to an advantage.

The parts and material slip differs from the conventional only in the way in which it is used. It is a sheet alike on both sides. When a job is assigned to a workman, and he needs a part or material he makes a requisition on the parts room. The clerk enters the job number, date, name of customer on this parts sheet and the parts. If the workman makes another trip or several for that matter, he gives the job number and the clerk instead of hunting for the parts sheet makes an entry on a slip, and later enters the material, etc., on the parts sheet. This, Mr. Baxter says, conserves the time of the stock room clerks as well as that of the workmen for they do not have to wait until the clerk locates the parts sheet.

Mr. Baxter believes that the large service station is entitled to buy all supplies and material direct from the manufacturer of service station equipment, and he pursues this policy whenever possible. He buys fan belts direct from one maker and lamps from another. Nuts, bolts, cotter pins and such parts are bought in quantity, direct from the maker. Brake lining is bought through a jobber in 1000 ft. lots although Mr. Baxter says he prefers to buy direct and has often done so. Clutch discs, bushings, bearings (plain), pistons and wristpins are bought in quantity and on several occasions these have been turned out to specification by manufacturers of this material.

Mr. Baxter believes that buying direct from the manufacturer will increase in the future and that with the big overhead expense of a service station the manager must make a profit on the material and equipment sold by him. He also says that much better service results when buying direct for in the event of faulty material the correspondence, etc., through the middleman is eliminated.

Station Making a Profit

Every department is charged a proportionate share of the overhead and an accurate record is kept of each department. Probably one of the reasons why the station is showing a balance on the right side of the ledger is that the cost of unloading chassis, greasing and tuning them up as well as other work accompanying the preparation of a truck for sale, or minor adjustments after it is sold, is charged up to the sales department and paid for by the latter. Too many dealers do not credit the service department for this work or, for that matter, credit the station for the floor space occupied by chassis in stock. When these conditions exist the service station cannot always be expected to show a profit for the profit is credited to the sales. In the case of the Schoepflins, the sales department knows what it costs to prepare a truck for a sale and to render the free service and comply with the maker's guarantee. It is the opinion of the writer that if more dealers would maintain a careful record of such costs, and credit the service station with the time actually spent for such labor, that the records would afford interesting reading to the dealer. And with the costs known it might be that some dealers would not be so liberal with discounts or large allowances for the trade-in.

Service and the Salesmen

The service policies of the Schoepflins are beneficial to all concerned. When a Schoepflin salesman waxes enthusiastic with a prospect, as they frequently do, he knows that he cannot give more than the policy of the company permits. If a salesman is competing on a trade-in and tries to raise the ante when he comes back to the office the sales manager will not accept the contract un'ess the allowance is the local market value of the truck and the inspector or appraiser passes on the trade-in.

Whenever a salesman turns up a prospect with time payments, and the rating of the prospect is not satisfactory, the salesman is told that the contract will be signed if he will assume the responsibility. Passenger cars are not accepted as part payment as the Schoepflins do not believe it practical.

There is an interesting feature to the Schoepflin organization and that is the company is one of the five original truck dealers who began to merchandise motor highway transportation some ten years ago. And it is equally interesting to note that of these five four are still in business while the fifth has retired—with his earnings. This answers the often asked question, is selling trucks a profitable and stable business?

A Neglected Point in Truck Maintenance

Experience has proven conclusively that a daily inspection of the motor truck is instrumental in adding hundreds of miles to the service life of the machine. Since expert supervision is indispensable, on account of the indifference of the driver, the service manager becomes responsible for keeping the equipment in first-class condition.

Even this service manager with all his mechanical knowledge, often will overlook the wood wheels. The reason for this lapse is simple enough. Barring accidents, this man may have handled trucks for years without a single wheel repairing job. The very fact that wood wheels stand up so well causes him to take their good performance for granted and leave them out of his inspections just as instruction books on trucks leave them out of their list of necessary attentions.

Every one knows that the wheels are exposed to thousands of road jolts in every mile traveled; that their natural resiliency is counted upon to absorb shocks that otherwise would be transmitted undiminished to unsprung parts. Other parts subjected to punishing duty of this character demand expensive upkeep. Not so with wood wheels. All they ask is an occasional coat of paint to preserve the wood grain from the elements. If this small attention is given promptly when needed, the wheel will perform almost indefinitely at the topmost point of efficiency.

Exports for April

Exports of passenger cars from the United States for April were 12,502, valued at $13,491,416. Trucks to the number of 1435 were exported, valued at $2,353,802.

Of trucks Norway received 45; Spain 57; England 330; Canada 179; Mexico 87; Cuba 157; Argentine 33; Brazil 113; British India 36; Dutch East Indies 33; Philippine Islands 39.

Gas Regulator for Vulcanizers

The Bacon Automatic Gas Regulator produced by the Bacon Vulcanizing Co., 1853 38th Ave., Oakland, Calif., is a safety device that will prevent a possible explosion of any steam-operated vulcanizing outfit. It is directly connected from the steam chest and the regulator is located in the fuel supply line. It will cut down the fuel supply at the predetermined pressure.

The regulators are constructed entirely of metal, are accurately machined and claimed to be positive in action. They are compactly built and have no wearing parts and are stated to last indefinitely. The price is $7.50 f.o.b. factory, Emeryville, Calif.

What is regarded as a record trip was made by a GMC truck. A new boiler was needed and could not be shipped from Erie, Pa., so a two-ton truck was sent after it and in just 48 hours from the departure it pulled into the factory with boiler aboard. The round trip is just about 600 miles.

Recommended Methods of Disassembling, Adjusting and Reassembling Brown-Lipe Amidships Type of Transmission

THE following are the factory methods for disassembling, adjusting and reassembling the Brown-Lipe four-speed, main frame or amidships transmission, made by the Brown-Lipe Gear Co., Syracuse, N. Y. The directions contained herein have to do with the transmission after it has been displaced from the truck chassis. No directions are given for the removal of the transmission from the frame as the methods of mounting vary.

The first step after the removal and placing the transmission on the bench is to **remove transmission cover** which is retained by cap screws. **Remove the cotter pin in nut** on either end of shaft, which is the main shaft. Then **remove the nuts and universal flanges. Remove stuffing box gland.** This is in the bearing cap assembly at the rear of the case or at the end opposite the guide-rod-bracket. A punch can be used to displace the gland.

Removing the Guide Rods

The sliding-gears on the mainshaft (square-shaft) are moved into and out of engagement with gears on the countershaft by guide-forks secured to guide or pull rods. These rods have notches termed poppet-notches. Poppets or wedge shaped members, which are spring tensioned, engage in the poppet notches acting as a lock. There is also an interlock, the function of which is to prevent movement of more than one gear into engagement at a time.

Remove the poppet plugs (3) which are on the guide rod bracket at the front of the case. **Remove the the poppets (3), springs and interlock** of each. **Screw out oil-plugs** on guide-rod-bracket. There are three. The guide rods are now ready for withdrawal. Insert round bar in eye of first and second speed guide rod, free it from fork, and **pull out rod.** Repeat operation with third and fourth speed rod and next the reverse rod. Lift forks out of case. Before removing rods it is well to note which way the hubs of the forks face so that time will be saved in replacing the forks on the rods. An accompanying illustration shows the correct assembly, also the rods lettered. As may be noted each have three notches but they are located differently.

How Bearings Are Removed

The mainshaft or square-shaft is in two sections. The outer ends are supported by Timken bearings and the rear shaft carries a small Timken at its forward end. This bearing has its cone in the drive gear on the front shaft. **Remove cap screws (4) and lock washers in rear bearing cap** of mainshaft, and **displace bearing cap.** It has a gasket between it and the case. **Remove cap screws and lock washers of front bearing cap** of mainshaft and remove cap. It also has a gasket. If difficulty is experienced in removing front cap, insert a small pinch bar on either side of drive gear and between gears and pry outward. **Remove cap with shaft and gear. Lift out rear shaft.** It has three gears.

Displacing Countershaft

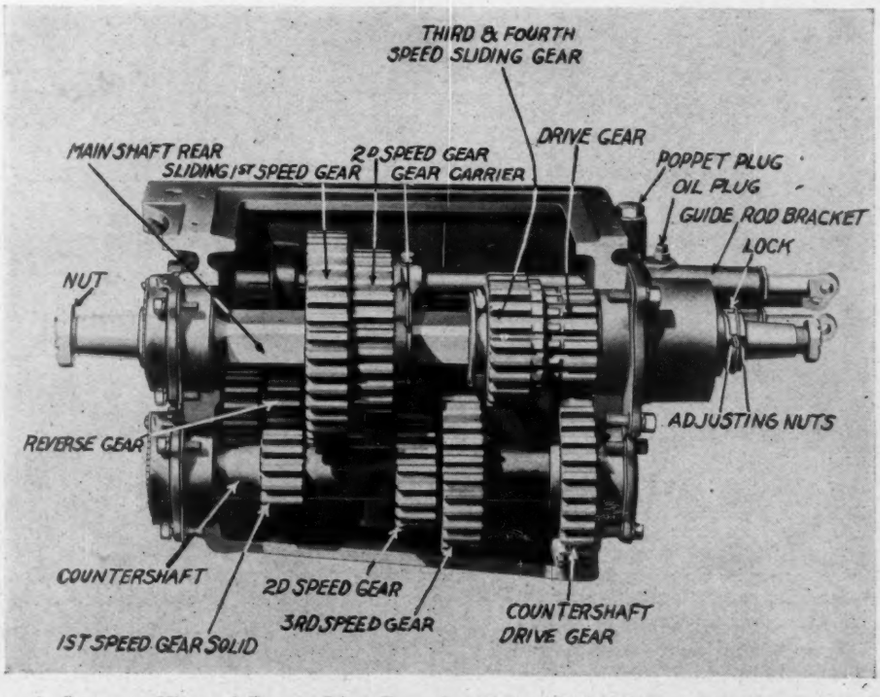
To take out countershaft **remove cap screws (4) and lock washers from rear bearing cap and remove cap. Lift out shaft assembly.** The next step is to **remove idler stud.** It has a squared head and stud and is prevented from turning by a boss or lug on the rear bearing cap of countershaft; that is, the cap lug has a flat side that contacts with the stud head. Back out stud. It has two bronze bushings in the idler gear. To remove and replace with new, press out old and press on new. The ends of bushing should be flush outside.

Before beginning work of reassembly thoroughly wash the gears, shafts, forks, poppets, springs, bearings, case, caps, etc., with kerosene. Smear all bearing parts with heavy oil such as 600 W before assembling. **Replace idler stud** and if bushings have been removed see that the larger gear is next to the case or housing. **Replace countershaft.**

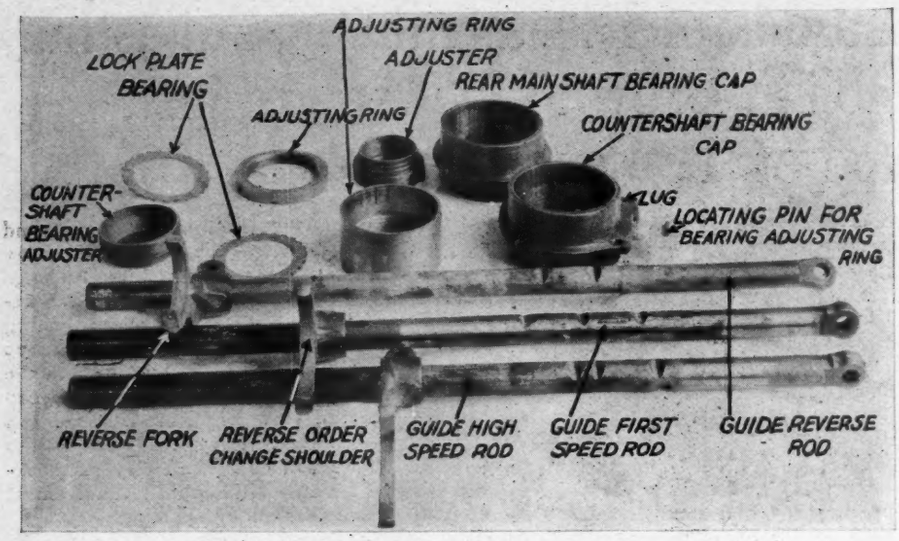
Replace rear countershaft bearing caps and see that gasket is clean and in good condition. If not use new. **Replace cap screws with lock washers.** The bearings, of course, must first be assembled and they should be well lubricated with heavy oil such as 600 W. Adjust these bearings if necessary. The bearing cap was removed without disturbing the adjusting mechanism. The first step is to **remove the bearing adjusting lock screw and the lock.** To eliminate play **turn bearing cap lock** to left (counter clockwise), using a punch or spanner wrench. Adjust so that there will be no end play or movement of shaft, although the shaft must turn easily. Test by spinning.

In the event a new drive gear is to be installed (front end) on mainshaft it will be necessary to straighten out the bent edge of the lock washers between the inner and outer adjusting nuts before the other nut can be displaced. **Remove outer adjusting nut, lock washer, and inner adjusting nut.** Drive or press gear and shaft out of cap. **Remove bearings (2) from drive gearshaft.** To reassemble place bearing on shaft, next the bearing spacer, then the second bearing, bearing cap, sleeve, adjusting nut, lock washer and adjusting nut. Do not tighten the last named until the bearing has been properly adjusted. Bend over edge of lock washer between notches in adjusting nuts, thus locking the nuts. An accompanying illustration shows these parts disassembled and the order of assembly.

Replace drive gear assembly part of mainshaft in case. **Replace rear main shaft assembly** with gears in case. SEE THAT SHIFTER GUIDES OF



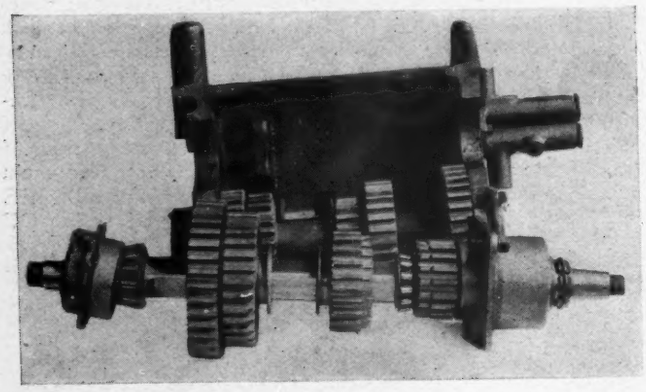
A Cutaway View of Brown-Lipe Four-Speed Amidships Type of Transmission
The main and countershaft gears are indicated as well as other components to simplify the work of disassembling



The Guide Rod Poppet Notches Differ in Location and Shifters Must be Replaced With Hubs Facing Eye End of Rod

The mainshaft bearing cap assembly is indicated at top and the countershaft assembly below. The guide rods are also indicated

GEARS FACE EACH OTHER. One is on the first and second speed gear and the other on the third and fourth speed gear. The correct assembly is shown in two accompanying illustrations. If care is not taken to place these gears correctly on the shaft, the forks will not engage and the rear mainshaft assembly will have to be again removed, reassembled and replaced.



The Mainshaft is in Two Sections and Rear Shaft is Supported by Bearing in Drive Gear.

The proper assembly of the gears and showing shifter guides facing each other is shown. Note the guide rod bracket through which the rods pass.

Replace cap screws and lock washers in front mainshaft bearing cap and see that gasket is in good condition. Set up screws. **Replace rear mainshaft bearing cap,** cap screws, lock washers and gasket and set up screws. Test bearings for play in shaft. Adjust if necessary and in practically same manner insofar as play is concerned, as any other shaft. There is a bearing adjusting ring that fits in the bearing cap and there is a locating pin for the bearing adjusting ring, and an adjuster. There is also a lock plate, etc. If packing in packing gland be worn renew it. **Replace packing gland nut.**

Assembling and Replacing Guide Forks

Replace guide rods and forks, beginning with the reverse guide and fork. This rod is easily identified as it has but two poppet notches. Slip rod through guide bracket opening (the lower hole furthest distant from the gears) and slip on fork with hub towards the eye of rod. There is a notch in shaft for correct location of fork. Replace cap-screw with lock-washer and set up screw. Next replace the first and second speed rod, which has three poppet notches equally spaced, and last the high speed rod. The hubs of the last two forks must also face toward the eyes. Replace cap screws and lock washers and tighten.

Note.—The forks and rods can be assembled previous to replacing the countershaft with its gears but in either case the forks will have to be meshed with the guides of the gears. If the rods are replaced last it is a simple matter to place the fork in position and slip the rod through the guide bracket and fork. Replace poppets, springs, interlocks, poppet nuts and oil plugs.

How and When to Lubricate

Fill transmission case with heavy oil such as 600 W until large countershaft gear is just covered. This will lubricate all working parts. Once a month remove drain plug, draw off old lubricant and flush thoroughly with kerosene. Drain off the kerosene and renew the supply of lubricant. In cold weather the lubricant can be thinned with cylinder oil. Should the lubricant work through the packing gland, tighten slightly. It is advisable in the overhaul of the unit to remove the breather or vent cap on the top of cover and wash the gauze as it may be clogged with foreign matter. In replacing cover see that gasket is clean and in good condition, and that cap screws set up tight.

Replacing New Gears on Countershaft

In the event a new gear is to be used on the countershaft use will be necessary of an arbor press. The first speed gear is integral with the shaft. The second is locked by two keys and is pressed until flush with shoulder on shaft. The third speed gear is next placed on (it is keyed) and pressed flush to the spacer between it and the previous placed gear. The last is the fourth speed gear, also keyed, and it is pressed flush against the long spacer between the third and fourth gears.

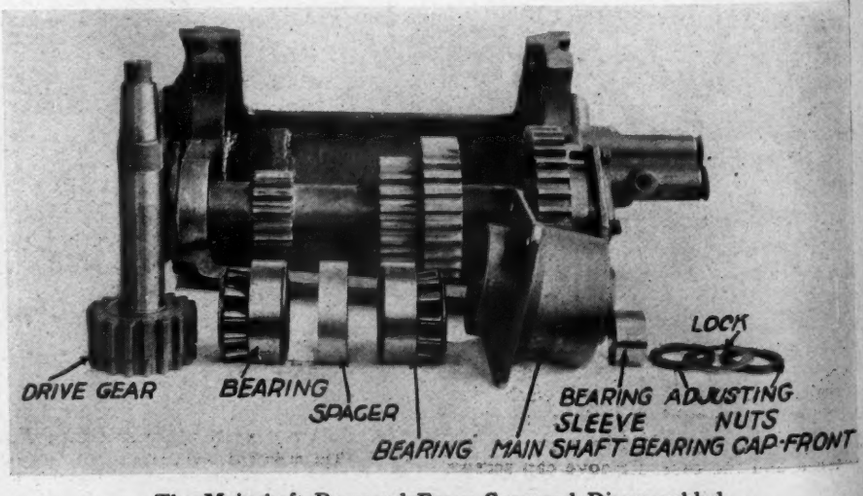
Gears Fail to Remain in Mesh

When gears do not remain in mesh unscrew the poppet plugs or nuts, remove and inspect the springs. If old and weak replace with new. If old are serviceable, stretch before replacement.

Disassembling 50 and 60 Clutch

The clutches employed with the main frame types of transmissions are separate units, are enclosed in a bell housing which is bolted to the flywheel housing of the engine. The Brown-Lipe clutches are of the multiple-disk dry-plate type, plain hardened steel plates contacting with metal plates faced with fabric.

Drive from the flywheel of the engine is transmitted through a drum bolted to



The Mainshaft Removed From Case and Disassembled

Showing the drive gear bearing, spacer, bearing, bearing cap, sleeve, etc., and their order of assembly

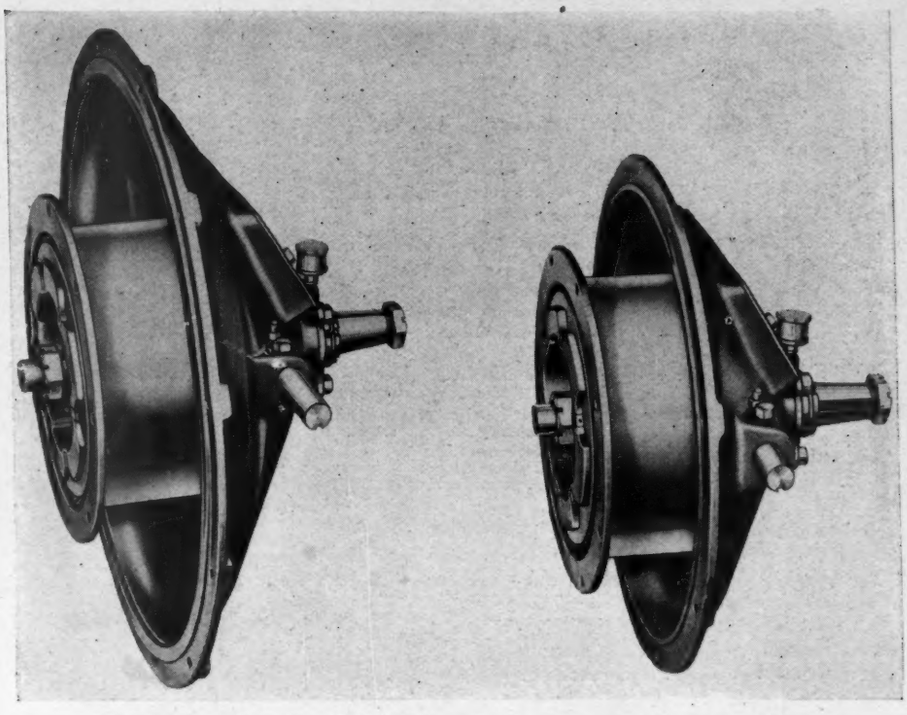
the flywheel, and a large number of teeth are cut in the interior of this drum, the driving drum. Teeth are cut in the periphery of the fabric disks and these teeth engage with those in the drum. The plain disks have slots cut in the inner periphery and these slots engage with keys on an inner drum. This latter is keyed to a shaft which is connected to the propeller shaft. Coiled springs between a pressure plate and spring ring (the pressure plate and spring ring are made a unit by three adjusting bolts) normally keep the disks in contact.

How Clutch Functions

With the disks in contact (clutch engaged) the drive or torque is transmitted as follows: Flywheel to driving drum (flywheel drum), through teeth in drum to teeth of fabric disks, to plain disks, inner drum, and clutch shaft. With clutch released or disengaged the driving drum and fabric disks rotate but the plain disks, inner drum, etc., remain stationary. Release or disengagement is accomplished by a shifter which compresses the springs sufficiently to permit the driving drum to rotate, without transmitting power to the plain, or driver disks. Explanation is made of the principles for the benefit of those not familiar with the clutch.

Removing Clutch From Engine

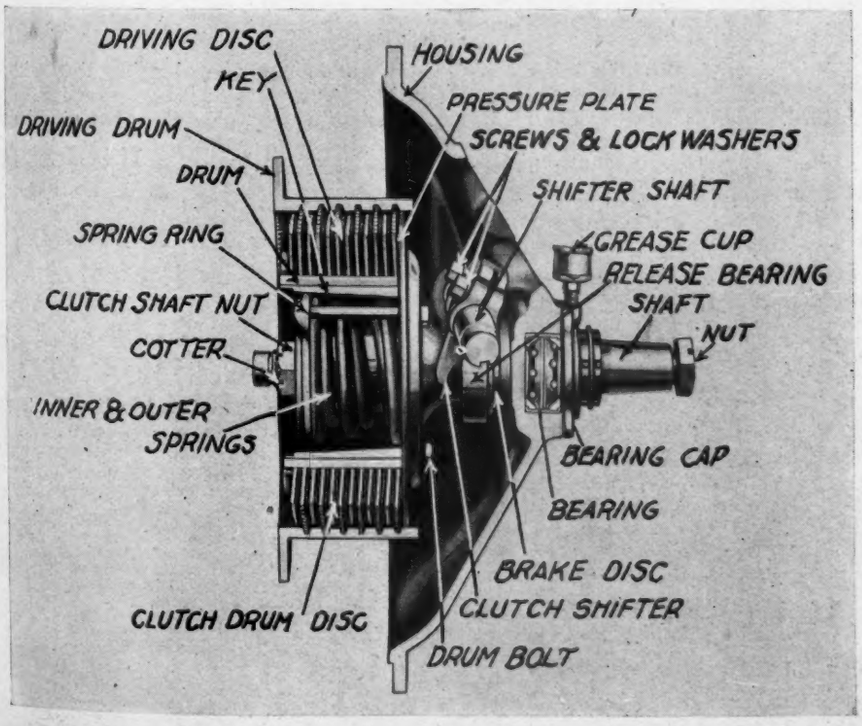
No instructions are given herein for disconnecting the propeller shaft, brake linkage, etc., as installations vary. To remove clutch from engine **take out cap screws and lock washers securing clutch housing** to flywheel housing, but take out top bolts last to avoid leverage breaking bell housing flange. The clutch with its housing can now be pulled out. The driving drum, however, remains bolted to the flywheel. If new disks are to be installed it is suggested that the flywheel drum be removed and employed to test fit of disks.



The Brown-Lipe Clutch, 50 and 60 Types, Assembled and in Clutch Housing

Remove hand hole plate to give access to shifter. **Remove the locating screw in housing** over the release shaft. **Remove cap screws and lock washers (2)** locking shifter to shifter shaft. **Drive out shifter shafts**—a long and a short one. Inspect shaft bushing and if badly worn replace with a new bush.

The end of clutch shaft, taper end, is supported in a ball bearing which is contained in a bearing cap. **Remove lock or adjusting nut, lock plate and adjusting nut. Displace bearing cap.** To **drive out clutch shaft,** tap taper end with lead hammer. **Remove clutch with shaft from housing. Remove brake disk. Remove clutch from shaft.**



Longitudinal Sectional View of Brown-Lipe Clutch With Components Lettered

Disassembling Clutch

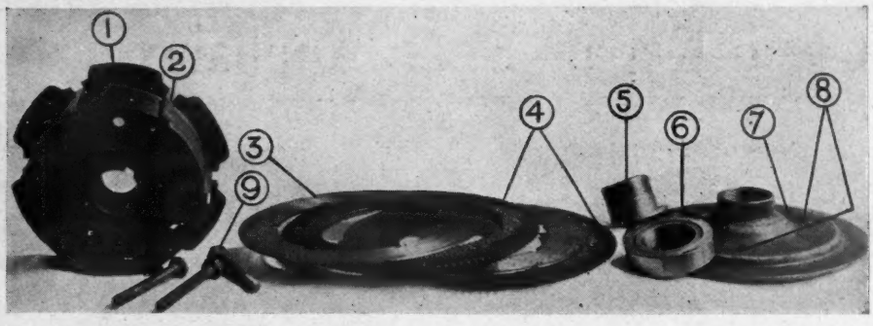
Remove cotter pin and nut from front end (flywheel end) of shaft. Either the factory tool or an arbor press will be needed to compress the clutch springs in the disassembly. Place clutch in press with spring ring uppermost and place a block of wood on spring ring. Block should not be wider than diameter of ring. Compress until heads of drum bolts clear pressure plate at least ¼ in. **Back out drum bolts (3)** until free from spring ring and remove bolts. **Remove spring ring and coil springs (2).** Lay clutch on bench, pressure plate uppermost, and lift off disks.

The first plate to be removed will be a driving member (fabric), the next a plain plate, and so on. The last plate to be displaced will be a plain member. The 50 type of clutch has six driving (fabric faced) disks and the 60 type eight. Examine the fabric disks and if fabric is torn or split replace disk with a new one. No trouble should be experienced with the plain disks but should one be damaged or surfaces rough, replace it with new.

Release Sleeve and Pressure Plate

The release bearing is mounted on a sleeve which in turn is threaded into the hub of the pressure plate. If sleeve is removed for any cause, and the bearing, it is important that the thrust bearing be so replaced that the word "Thrust" on side of bearing faces the pressure plate.

Inspection should be made of the keys on the inner drum. If badly worn replace with new. The old members are



Showing Clutch Inner Drum, Bolts, Discs and Pressure Plate. Keys on Drum Are Renewable, Being Riveted

Note the slots in pressure plate with which lugs on drum bolts register. The release sleeve and release bearing are also shown

1. Drum
2. Key and Rivets
3. Drum Disks
4. Driving Disks
5. Release Sleeve
6. Release Bearing
7. Pressure Plate
8. Drum Bolt Slots
9. Drum Bolts

riveted to drum and the rivets can be sheared by driving out the keys. In fitting new keys see that rivet on outside of key are well peened over and flush with surface of key. This is important for unless surfaces are smooth the plain steel disks may catch or bind.

Adding Extra Plain Disk

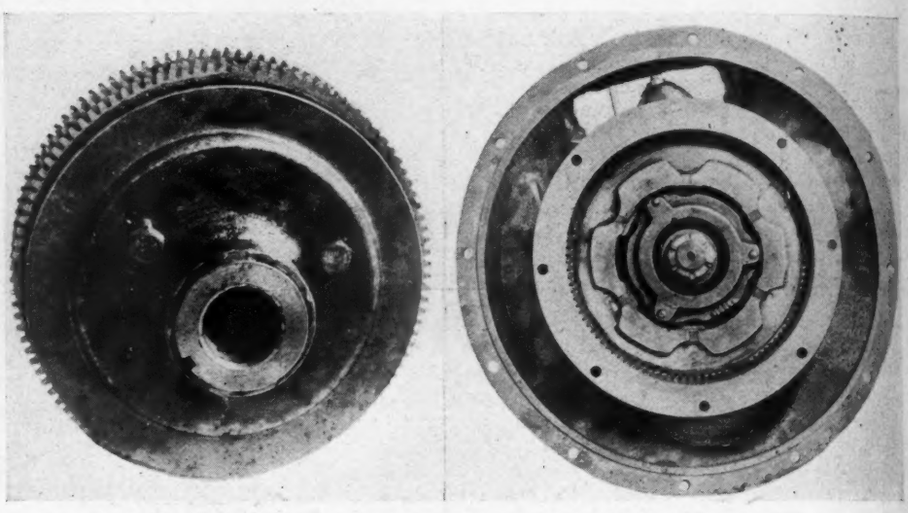
If the maximum adjustment of clutch does not obtain the desired results an extra plain disk may be added. It is placed next to the front disk to be replaced, a plain member. In the reassembly of disks care must be taken to locate the plates in order. Start with a plain disk and end with a fabric member.

The clutch adjustment is simple provided the drum bolts are properly turned. In reassembling the bolts turn them until the screw ends are just flush with the surface of the spring ring. Further adjustment will be required but it is important that each of the three bolts be turned exactly alike. Pressure plate has a slot on either side of bolt hole, and there are lugs or bosses on the inside of the head of bolt. These lugs register in the slots, preventing the bolt from working loose. To adjust turn each bolt one-half turn or through 180 deg., or until a click is heard. AND TURN EACH THE SAME NUMBER OF HALF TURNS. It may be that the driver of the truck has attempted to adjust the clutch and failed. When trouble of this kind be encountered it is suggested that the clutch be removed and the drum bolts be backed out until they are flush, as previously explained, and readjustment made.

Care and Lubrication of Clutch

Before beginning the work of reassembly clean all components. Use 600 W to lubricate the bearings and smear the plain disks. There is a pilot bearing on the front end of clutch shaft which functions only when clutch is released. Pack this bearing with heavy grease. Grease cups are provided on housing and these should be turned down every 500 miles of service of truck.

If the clutch drags or fails to release it may be due to a split or torn fabric, rust of plain disks or to a loosely fastened driving drum. It is important in replacing the clutch housing that its face and that of the flywheel housing be perfectly clean and that the cap screw be set up tight. Foreign matter will impose stresses on the pilot bearing that will bring about wear which will be due to the misalignment. No directions need be given for the reassembly of the clutch, as the process is the reverse of the steps or instructions that appear in the black face type.



Left: Showing the Clutch Removed From Shaft and the Pressure Plate

The drum bolts are shown in pressure plate and one bolt is partly backed out

Right: Front View of Clutch Removed From Engine and Showing Housing, Clutch Drum, Inner Drum and Spring Ring

The contact surfaces of housing, drum and flywheel must be clean and bolts set up tight when replacing the nut

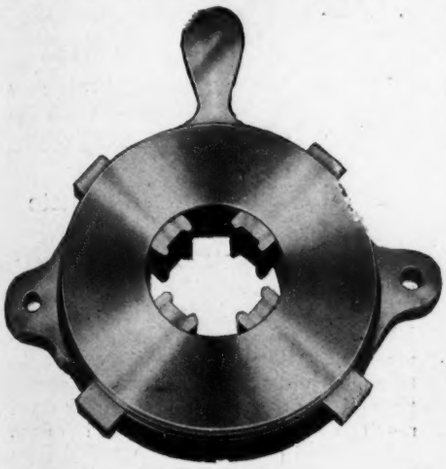
Two-Ton Twin City Truck Which Traveled Overland From Minneapolis, Minnesota to Peoria, Illinois.

This Twin City truck traveled overland with a load of 4700 lbs. from the Minneapolis Steel & Machinery Company's factory, Minneapolis, to its branch at Peoria, Illinois, a distance of 562 miles. The actual running time was 50 hr., averaging about 10.1 m.p.h. This 2-ton and a 3½-ton truck are recent additions to the well-known line of Twin City Power Farming Equipment.

Service Station and Repair Shop Appliances

Universal Vise

A universal vise that will securely hold any size piston, for reaming, removing and replacing bushings, set screws, piston rings or cleaning it of carbon, was recently announced by The Auto Metal Parts Co., Des Moines, Iowa. This device also accommodates Ford triple gears, timing and transmission gears of any size up to 4⅝ in., for reaming, filing or any other kind of repair work; Ford low speed, reverse gear, or brake drums for reaming bushings or repairing wheels and wheel hubs in removing and replacing wheel bolts, ball races, ball retainers, bearings, etc.



Universal Vise
It will clamp anything that is round from ½ in. to 4⅝ in. diam.

It has four removable jaws, adjustable to a large or small opening for the reception of either concentric or angular objects, by revolving the handle. By manipulating this handle all four jaws are simultaneously moved equal distances. Two and one-half turns make a complete movement of the jaws. This vise comes regularly equipped with two sets of hardened tool steel jaw faces, and is designed to hold objects from ½ to 5⅝ in. diam.

Sasco Solder for Aluminum

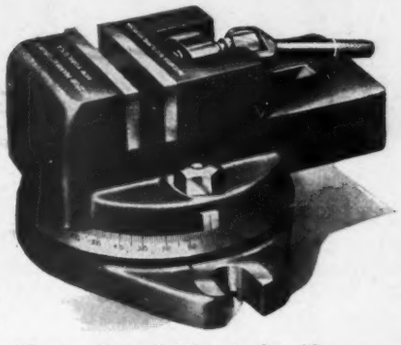
Sasco Solder can be applied to both cast or sheet aluminum. It is manufactured by the Smith Aluminum Mfg. Co., 1425 N. Felton St., Philadelphia, Pa. Before starting to make repairs with this solder, the fracture is chipped to a V shape and then cleaned with a wire brush. The aluminum to be repaired is then heated until the solder melts from the heat of the casting, then the surface that is to be soldered is brushed well with a wire brush. The solder is next flowed in to fill up the joint. When applying solder, acids, flux or chemicals must not be used. This solder can be applied by gas, gasoline, oxy-acetylene torches, Bunsen burners or soldering iron. It melts at 428 deg. Fahr.

Nestor Bench Vises

Two models of vises, each made in four sizes, of both the plain stationary and swivel type, were recently introduced by the Nestor Mfg. Co., Inc., 40 W. 13th St., New York City. These simply constructed vises are strong, durable, and machined true and square.

The stationary model can be set upright on its side or end, enabling workman to drill holes at right angles, without removing the work from the vise. The yoke for clamping the work in the vise is case-hardened and has a square-thread screw. The yoke pins engage in the milled rack on the body of the vise. Even a slight turn moves the jaw and the strain is applied so that the jaw cannot strain upward. The jaw is quick-acting and can be moved up close to the vise, with the result that little time is lost in adjusting. The jaw plates are hardened and ground and held in place by screws, allowing the ready use of formed jaws.

The swivel vise is constructed as durably and simply as the stationary model. A ring is used to cover the T-slot in which the bolt heads travel, to prevent an accumulation of chips from clogging the slot. Keys for locating the vise are supplied.



Nestor Swivel Vise is for Use on a Machine Work Bench

The maximum openings of the various models in each style, are: 2½, 4, 6, and 9 in.

New Water-Mixed Grinding Compound

"Pep", a new grinding compound using water as a mixing liquid instead of oil, is being brought out by the Worcester Abrasive Co., Worcester, Mass.

It is non-magnetic, and contains no metal dust, glass or emery. In this compound Crystolon is used, which is saw dust, coke, salt and sand fused in a hot electric-furnace. It is claimed not to dry within a reasonable length of time and that it does not freeze in a temperature of 300 deg. below zero, as water is of much lower viscosity.

This compound is put up in 4 and 16 oz. cans with lithographed directions on each tin.

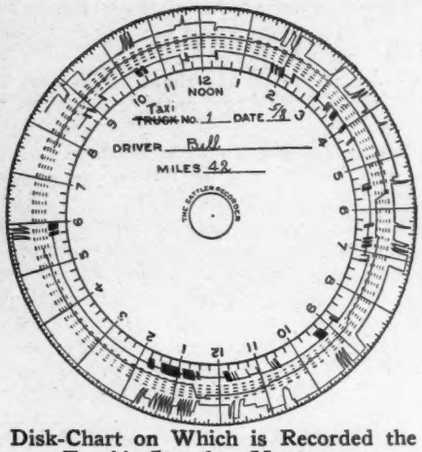
Sattler Recorder

The Sattler Recorder, manufactured by Hans Sattler, Sheboygan, Wis., gives a complete graphic record of the movements of a truck for 24 hours. In fact, it records all those details entering into the maintaining of an accurate cost record of truck operation, not only giving, in addition to other data, a full record of the total mileage, but it also tells at what rate the truck has been driven.

The duration of every movement and stop, whether long or short, the time they occur, the speed at which any mile or part of a mile was made, and miles per hour, are indubitably and legibly registered on a 6-in. disk-chart. To guard against tampering, an extra time record, having no connection whatever with the running mechanism of the truck, being actuated entirely by the side-sway of the vehicle, is included, which provides the owner with an irrefutable check against unscrupulous drivers, thus making the instrument absolutely reliable. This instrument practically plays the role of the employer forever at his side. Not only is every truck movement chronicled, but any attempts at tampering with the recorder is indicated on the chart.

The recording chart which accompanies the device is divided into 24 hours and 3 zones, namely: outer, center and inner. The markings in the outer zone give the speed and time. Any circular line, no matter how long or short, represents a stop, and any cross or zig-zag line, no matter how short, running time. The center zone gives the mileage. In this zone five mile-runs are represented by each space between five dotted circles, that parallel the circumference of the disk. In the inner zone the markings representing stops correspond with those in the outer zone but are heavy cross lines, instead of zig-zag lines. This gives that second record of the working time of the vehicle, which provides the check against tampering as it has no outside connection.

Sattler Recorder
It registers unchangeable record of a truck's daily service, imparting to the owner an accurate account of its performance.



Disk-Chart on Which is Recorded the Truck's Complete Movements

This instrument is substantially built, and is guaranteed for one year. It sells for $65 complete with fifty disk-charts.

Randall Graphite Bronze Bushings

Randall bushings, manufactured by the Randall Graphite Sales Co., 711-721 Fulton St., Chicago, Ill., are made of phosphor bronze and filled with a lubricating graphite. It is claimed that they will not stick, freeze or score the shaft, as the graphite fills the open or porous parts, giving the shaft a very smooth surface, reducing friction. They may be exposed to the elements or oiled if desired, as oil or water does not wash out or cause the graphite to go below the surface. The graphite wears uniformly with the bronze and does not crumble or become soft. A proper amount of pure graphite is supplied to the shaft continuously. They are designed to run easily even under severe conditions.

The non-perforated Randall bushing is designed to meet the demand of a high-grade graphite bronze bushing that will not wear grooves or high points on the shaft, and give satisfactory service either with or without oil. This style is furnished with spiral, diamond shape, or double figure eight. Valve stem or plain cast iron bushings are grooved and filled with Randall graphite, which fills or glazes the surface. The perforated bushing has the added advantages of Randall graphite, which will not wash out. Graphite bushings are furnished in all sizes and to any special design, according to specifications.

One of the Randall Graphite Bronze Bushings
They are made of phosphorus bronze and filled with lubricating graphite

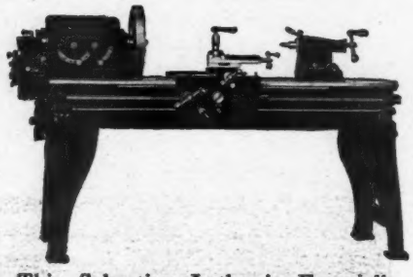
Sebastian Engine Lathe

Various sizes and models of lathes for all kinds of lathe work are being manufactured by the Sebastian Lathe Co., Cincinnati, O.

One of the Sebastian lines, the 15-in., designed especially to meet the requirements of repair-shop and service-station work, is a straight bed, geared-head engine lathe.

The lathe is durably constructed and rigidly supported on reinforced legs. The hollow spindle is made of composition metal based on special formula. The gears are fully enclosed, protecting them against dust and dirt.

The tail stock is of the cut-under design. Provision is made for taper turning. The carriage is built along lines of the latest and most approved construction. The compound rest, which is regularly furnished, is mounted on a strong and well braced apron. The tool post which is of solid bar-steel has a hardened set screw with rings and weights. The deep and heavy bed of this lathe is well braced with cross rods.



This Sebastian Lathe is Especially Adaptable to the Needs of Repair Shops

The rack is cut from a solid bar and the countershaft has patented friction clutch pulleys with large friction surfaces and an ample provision for lubrication. Another model, a cone-head engine lathe, which gives eight speeds, is similar to this model.

The T and T Tire Dressing Wheel

The T and T tire dressing wheel, put out by the T and T Tire Dresser Co., San Francisco, Calif., and distributed by the Fairbanks Co., New York City, is a tire repairing appliance, that will facilitate work in the vulcanizing shop and other places where tire repair work is taken care of.

This tool is designed to remove surplus rubber and to provide a satisfactory vulcanizing surface on the carcass of the tire after the operation of buffing has been performed. The producer claims that it can be readily dressed down and that it will not tear the fabric or in any other way affect the tire.

An exclusive feature of this tool is said to be the fact that the blades are removable. Although they are readily removable for replacement of new blades, they are securely held in place, resisting the centrifugal pulling forces of high speed.

T and T Tire-Dressing Wheel

The complete outfit sells for $16.50 and an extra set of blades may be had for an additional $4.

Ford MagFixer a Magneto Tester

A magneto trouble detecting device is a new instrument of the Stahl Rectifier Co., 1041-04 West Jackson Bldg., Chicago, Ill. It is claimed that by utilizing this device any magneto difficulties can be determined in a very few moments, permitting of a very rapid repair, which will result in an economy of time and expense.

The Ford MagFixer is connected to a battery and to the magneto post. By pressing the meter button, the pointer in the dial is electrically accuated, indicating whether or not the trouble is located in the magneto or just exactly what the trouble is. If the pointer rests under the registration—number 10, it proves conclusively that the magneto is in a weakened condition. To remagnetize, it is necessary only to push the make-and-break lever back and forth four times, which will remagnetize the magnets.

But if, after pushing the meter button, the pointer should stop between numbers 10 and 15, then the magneto is in fairly good condition; if it goes up between 15 and 20, then it is in the very best of condition.

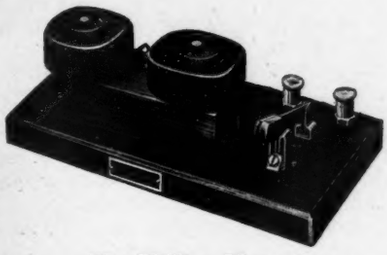
The passing of the make-and-break lever back and forth is accuated by a spring so timed as to leave the current on just long enough to get the proper recharging of the magnet. Each time the switch moves from side to side it passes over two contacts, so that there are two charges sent into the magnet. Only in

The Ford MagFixer
It determines and remedies Ford magneto troubles

extreme cases is it necessary to move the make-and-break lever back and forth more than the conventional number of times. In case the pointer first stops between 0 and 5 it indicates that there are shorts somewhere in the coils, in which case the switch B at the side is pulled down, and any metal chips up to ⅛ in. in diam. are immediately burned off.

Phillips Model 101 Magnetizer

A recent addition to the H. E. Phillips & Co., Union City, Ind., line of products is the Phillips Magnetizer, an essential device that should be included in every well equipped garage.



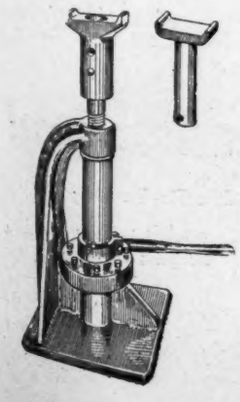
The Phillips Magnetizer

Gives new life and increases the magnetism of exhausted magnets.

This instrument is designed to operate from any six-volt storage battery or five or six ordinary dry-cells, which will furnish sufficient energy for remagnetizing from 75 to 100 magnetos. In its construction there are no moving parts, nothing to get out of adjustment, nothing to wear out. Complete instructions for operating accompany each outfit. It sells at $7.50.

New Whitney Jack

The R. S. Whitney Mfg. Co., 74 Nicholas St., Lewiston, Me., has added a strongly made jack for the repair shop, and service station, to their line. This jack has ample area at the base to give rigid support. It is of the screw type and a lever is employed to raise and lower the screw. It is attached by means of a collar to the rotating nut, thus increasing the flexibility of this jack. The rotating nut is at the extreme lower end of the screw to give the greatest possible clearance. This jack is made in one size and is adaptable for all classes of work. This price is $25 east of the Rocky Mts. and $30 west of the Rocky Mts.



Screw Type Whitney Jack

It provides ample base area

Electrical Grinder and Bench Drills

Several items of interest to the automotive trade are being produced by the United States Electrical Tool Co., Cin-

U. S. Electric Valve Grinder

This grinder will operate on either direct or alternating current.

cinnati, O. Among these are the portable electrically driven bench drill and the electrical valve grinder. The valve grinder is featured as a quick operating and easy handling appliance making possible the saving of time and labor cost. It is equipped with a Westinghouse universal motor, the armature operating in ball

U. S. Bench Drill

Is a portable electrcially driven bench drill for tapping and light drilling

bearings. The body of the device is aluminum. The complete grinder weighs approximately 8 lb.

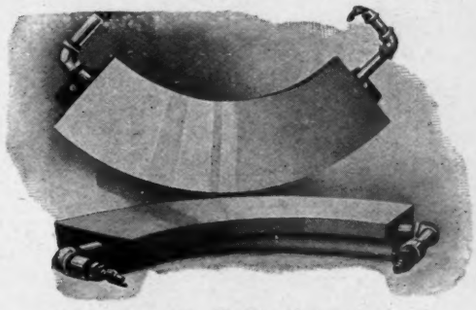
The portable electrically driven bench drills, type S and SA, are designed for light tapping and drilling. The portability of these drills makes them especially adaptable for various kinds of light and intricate work, as they can be easily moved about to any position on the work bench. A ¼ hp. motor furnishes power. These tools will drill up to a ½ in. hole. The spindle has a travel of 8 in. and the drilling table has a diameter of 12 in.

P. I. W. Inside Cord Patch Vulcanizer

The P. I. W. Inside Cord Patch Vulcanizer manufactured by the Pechstein Iron Works, Keokuk, Iowa, is made in halves so that it can be inserted into the tire without any effort incident to spreading the beads.

First one half and then the other is inserted into the tire until both halves fit together over the patch to be vulcanized. The tread is then filled with wet soapstone, the tire wrapped, an outside vulcanizer placed over the patch and steam turned on, an operation involving the same method of procedure employed in the conventional vulcanizer. This method not only eliminates much hard work, but also enables it to be finished quickly and satisfactorily.

Each half of this vulcanizer is an individual unit which permits the steam to be turned on in either side wall without danger of over-vulcanizing the other side of the tire. It is made of smooth castings.



The P. I. W. Patch Vulcanizer

the two facings of which are accurately machined. Each half has a steam connection and a pet cock outlet. The walls of the steam chamber are of uniform thickness, giving an even distribution of heat. A lug cast on each end of the castings has a hole into which a hook can be inserted and the two halves separated and taken out of the tire easily. It is made for tires ranging from 6 to 10 in.

Spook Skid Chain Machine

A new device that facilitates the replacing of old or broken cross links with new in any skid chain, was recently introduced by B. & A. Machine Co., 203 West 75th St., New York City, which not only manufactures this device but distributes it also. It is known as the Spook Skid Chain Machine.

It is of simple construction and permits of easy operation, requiring but a slight pressure of the foot to replace a new link. Two operations are performed simultaneously, the knife points enter and remove links, while new links are closed.

The great time-saving feature of this appliance makes it particularly valuable in the garage where work of this nature is done in quantities.

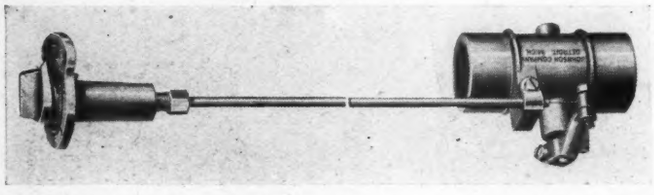
The Spook Skid Chain

It removes and replaces old for new cross chains with equal facility

Temptrol; a Temperature Control

A positive temperature control that is operated by hand entirely from the instrument board, and that is also claimed to save gasoline, reduce the quantity of unburned gas in the cylinders and decrease the possibility of dilution of crankcase lubricant, thereby indirectly protecting the main engine bearings, is being offered by the trade by The Johnson Co., Detroit, Mich. It is known as the Temptrol. It permits of the warming up of the engine promptly after starting and maintaining the temperature, regardless of weather conditions. When the engine is stopped it conserves the heat in the water jacket, permitting starting by turning the knob to the extreme hot position.

Temptrol accomplishes this with but two operating parts—a dash control and a butterfly valve set into the hose line.



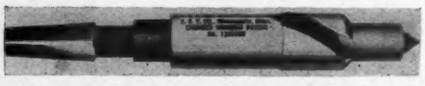
"Temptrol" Quickly Warms and Controls the Temperature of an Engine.

It is inexpensive, easily installed, and because of its simplicity it is stated to be a positive and unfailing means of keeping the engine at the right operating temperature all the year around.

It operates as follows: The controller consists of a butterfly valve placed in the circulation pipe. The operating rod runs to the instrument board. A touch closes Temptrol and temporarily traps the circulation water in the engine jacket where it quickly heats to an efficient temperature. Slowly opening the valve gradually brings the entire radiator contents to an efficient temperature while under way, then holds it to this zone of temperature while running. The little control on the dash is simply adjusted to weather conditions. It sells at $7.50.

New Battery Link Cutter

The Auto Electric Sales Co., 2540 Hennepin Ave., Minneapolis, Minn., has recently introduced an improved link cutter for battery use which is claimed to make it a more practical tool, and also permits a more simple operation.



This Link Cutter Permits of the Removal of Battery Links Without Affecting the Original Posts

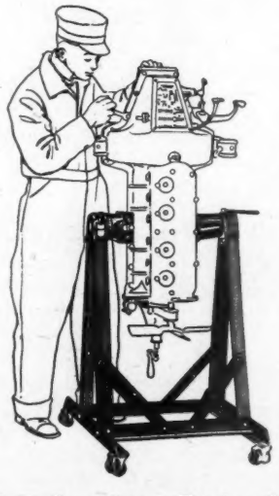
The new feature of this tool is the fact that the posts are not cut away, the original posts are left intact in exactly the same condition as originally assembled on the battery. This eliminates the necessity of rebuilding the posts when the links are again replaced and reburned, and also removes any possibility of sealing compound, acid and dirt from getting into the drilled hole, thereby causing a lead scum which must be removed before further burning can be accomplished. Because of its use, the posts remain intact and clean, it is only necessary to place the links on the posts and continue with the burning operation.

Besides giving a good clean electrical connection for recharging, the Link Cutter in leaving the posts intact, gives the repair man an opportunity to get the proper hold on the posts, enabling him to remove the plate-groups from the hard rubber jars without any difficulty.

This cutter is made of tool steel, carefully hardened, and will fit any blacksmith drill-press or hand-brace. It sells at $5.

Continental Engine Stand

In order to provide the trade, which has been incessantly demanding that the Continental Auto Parts Co., Columbus, Ind., include a special engine stand for the Ford power-plant in their line of stands, this company recently introduced a new Ford model. This new model permits of the easy handling of the power-plant when repairs are necessary and all parts can be stripped right down from the cylinder block and rebuilt on to the cylinder block without removing or changing its position in the stand. It allows the revolving of the power plant and the locking of it in any position desired. The engine is clamped by a bracket on each side. The stand is strongly constructed, most parts being of steel. Malleable casters are used and the height is 34 in. The shipping weight is 115 lb.



Model F Continental Engine Stand for Ford Power Plant

More-Jones Products

Armature babbitt metal, one of several metals and alloys offered by the manufacturer, the More-Jones Brass & Metal Co., St. Louis, Mo., is designed to adequately resist any deteriorating effects of high speeds, and strains encountered in automotive work. No lead is contained in this brand.

Phosphor bronze babbitt metal is a tin-base, copper-hardened babbitt metal, that is claimed to stand up indefinitely against the wearing action of two contacting surfaces, and run cool with speeds from 3000 to 5000 r.p.m., under heavy pressure. This brand is especially applicable where the service calls for a metal that will not creep, crush, flake or spread under heavy-duty.

Showing the Form in Which the Metals and Alloys Are Put Up by the More-Jones Co.

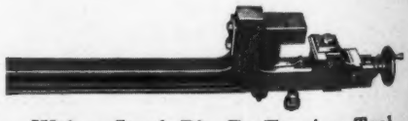
Rex babbitt metal is an anti-frictional metal. This tin-toughened copper, hardened metal will, the manufacturer states, give satisfaction in bearings, running at normal speeds and under medium heavy pressure.

Another product of this company is "Tiger" bronze bushings and sticks, a bearing metal especially adapted to automotive service.

Weber Re-Turning Tool

The Sawyer-Weber Tool Mfg. Co., Los Angeles, Calif., recently brought out a new crank-pin re-turning tool designed to accommodate practically all sizes and makes of crankshafts. One of the features of this tool is the fact that all the four pins of a crankshaft can be turned and finished from one setting.

The tool is adjusted to the required dimension and attached to the crankshaft, which is held between the centers of the lathe. When the lathe is thrown into action the tool rides around with the pin, the handle resting at all times along the front edge of the bedway of the lathe. The low speed at which the crankshaft is rotated, as the lathe is thrown in the back-gear speed, enables the operator to clearly see the cutting operations at all times. A hand-wheel at the top of the tool feeds the cutting tool into the pin. A dial below the wheel graduated into thousandths, can be locked by means of a set screw, in any position, thus making it easy to turn all the pins to exactly the same size.



Weber Crank-Pin Re-Turning Tool

The pin is held firmly in place independent of the cutter by three supports. One of these supports is an adjustable bronze shoe that can be regulated while the tool

is cutting, and which forces the pin back against two hardened steel plates in a V block.

The cutting tool used is a forming tool, the width of the pin, and the corners are rounded to cut the fillets. It starts cutting the pin until the low spots are cleaned up. The cutter is securely clamped in a "V" slot, and is parallel to the back plate at all times, thus generating a true circle. On the V block are graduations, which are used in setting the block for different diameter pins.

The New Model Eclipse Valve Grinder

The new model Eclipse Valve Grinder, manufactured by the Eclipse Valve Grinder Co., 29th St. at Oak, Kansas City, Mo., is said to facilitate quick and accurate repairs in view of its construction, which lends to ease in handling.

Eclipse Electric Valve Grinder
It is the latest addition to the Eclipse line, and is a strong, well-balanced portable power - driven tool.

The motor, which is controlled by a trigger switch in the handle, is much stronger than those that were used in earlier Eclipse models. It is made by one of the most reliable electrical manufacturers in the country.

The housing of this grinder is of tough aluminum alloy made in two compartments, effectively separating the grease-packed mechanism from the motor. The bearings, both for motor and mechanism, are of bronze metal. The gears, pinions and other moving parts have been enlarged and are made of steel alloys, properly heat-treated to insure strength and wearing qualities.

The selling price is $50, f.o.b. Kansas City, complete with valve bits, lifting springs, flexible cord, separable attachment plug and full instructions.

Durkee Eye Magnet

As a first-aid instrument for the removal of flying chips of iron or steel, or from suspended metallic dust, from the eye of the workman, the Durkee Eye Magnet is an indispensable device which every garage or repair shop owner should have. The importance of having such an instrument on hand, the manufacturer points out, should be considered from two viewpoints, as a humane precautionary

Durkee Eye Magnet
Rendering first-aid by extracting small chips from eye

measure and from a compensation standpoint. Many cases make immediate attention imperative.

This instrument is simple in its application, and does not require a skilled surgeon or physician to use it. It is designed so that the core of the magnet exerts a minimum pull on small particles near the point. A powerful electro-magnet, which is light and small enough to be easily held and manipulated in one hand, is the most important unit of this instrument. A convenient support rests the weight of the magnet upon the operator's arm, leaving the fingers free to direct the magnet point. The point is specially designed, not being sharp enough to injure the eye and yet is small enough to be directed close to the tiny particles of iron and steel, imbedded therein, to be removed.

Close to this point a small flash-lamp-bulb is placed and wired so as to throw a soft light directly on the injured eye. The magnet, however, can be used independently of the lamp. Each outfit is furnished with two extra bulbs, and the ordinary 3-8 volt pocket flash-lamp may be used. The Durkee eye magnet is distributed by Holz & Co., 17 Madison Ave., New York City.

National Metal Products

Among the numerous materials produced by the National Metal Molding Co., Pittsburgh, Pa., the following are of interest to the trade: Sheraduct—used for sheradized rigid steel conduit and fittings; Economy — enameled rigid steel conduits and fittings; Flexsteel—armored conductors, conduits and fittings; National——metal moldings and fittings, locknuts and bushings, solid switch boxes, outlet boxes and covers, stamped steel fixture studs, wall brackets, and Autoflex-Tube, Steelflex and Brassflex.

Boston Gear Works Products

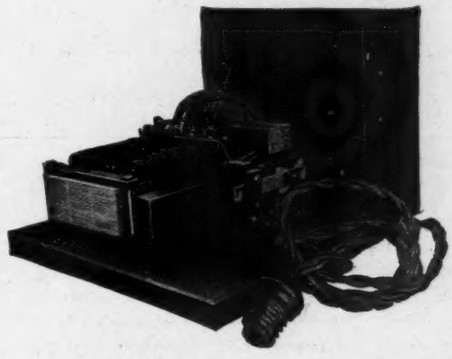
The line of the Boston Gear Works, Norfolk Downs, Quincy, Mass., includes machines for the production of accurate, interchangeable gearing, etc.

The following are some of their products, steel gear gages, standard steel bushings, grooved pulleys, steel racks, brass and steel pinion wire, finished brass internal gears, finished brass spur gears, cut steel spur gears, cut iron spur gears, change gears, finished brass miter gears, steel miter and bevel gears, cut iron miters, cut iron bevel gears with steel pinions, hardened steel worm gears with threads ground, brass worm gears and worms, hardened steel helical or spiral gears, sprockets, steel chains, diamond block chains, bronze steel and solid ball universal joints, annular ball bearings, single and double row, thrust collar bearings and patent ball bearings.

Cambridge Rectifier

The Cambridge Rectifier, manufactured by the Clapps Eastham Co., Cambridge, Mass., is a device for charging storage batteries from alternating current, and is suited for use where it is not desired to charge a large number of cells at one time. If automatic means of charging is not available, the Cambridge Rectifier proves very convenient.

This device is designed to permit alternating current to be used safely and economically to charging any battery. The



The Cambridge Rectifier is Used for Charging Batteries From Alternating Current

current on entering the rectifier is passed through a transformer to lower its voltage to slightly more than the battery voltage. The current is then conducted through a vibrating reed which oscillates to and fro in unison with changes in direction of the alternating current. On the end of this reed is a contact point which contacts with another similar point connected to the storage battery whenever the current is flowing in the wrong direction. Thus impulses flow into the battery in one direction only, and the instrument is so constructed that it automatically charges in the right direction regardless of which direction the battery is connected.

This rectifier is not only low in its initial cost, but there are no lamps, liquids, rheostats or other parts likely to become broken or require frequent renewal, while the cost of maintenance is very small.

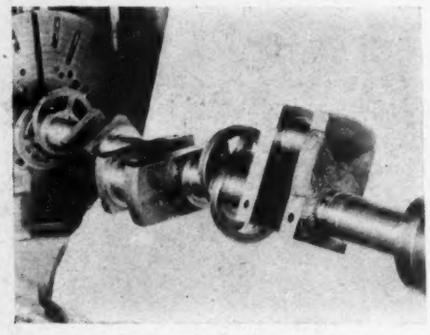
No technical skill is required to use this rectifier, the plug is simply screwed into any lamp socket supplying sixty-cycle alternating current, and the two wires from the rectifier to the storage battery terminals are connected, and the battery begins to charge. It is self-starting, and in the event of a temporary failure of the supply current, the battery is automatically cut off so that it cannot discharge back through the rectifier. Upon the

restoration of the service it automatically starts charging.

This instrument is mounted on a substantial slate base 10¾ x 9½ x ¾ in. thick, and is enclosed by a removable steel cover finished in black Japan, 2½ in. high above the base. The complete instrument weighs 25 lb., and the shipping weight is 35 lb. It sells at $25.

Electric-Arc-Welding for Repair Work

In the manufacture of automobile bodies and engines, electric-arc-welding has resulted in increased mechanical strength of the parts so joined and increased rapidity of production.



Showing Repair on One of the Cranks

There are various places, in the body for example, that lend themselves well to welded joining, such as the seams of gas tanks, radiators and various joints in the frames. Formerly these joints had to be riveted, which necessitated much extra machine work for boring holes, and more time to accomplish the riveting. With the electric arc, no preliminary work, other than cleaning the parts to remove scale, or grease, is necessary.

The same theory applies to joining parts of the engine, and other running mechanism, such as the seams and joints of steel manifolds, steel pistons, welding rolled steel plates to gear cases, and welding steel pistons.

Hub Stamping With Dust Cover Welded With Metallic Electrode by the Automatic Arc Welding Process

The features that contribute to the effectiveness of the electric arc for these purposes are the fact that it is convenient for use in more or less inaccessible places, that the heating is localized, so that no allowance need be made for expansion and contraction of the parts to be welded, and that no preheating is necessary.

The development of an automatic arc-welding-head, by the General Electric Co., which is applicable to numerous sorts of what may be called routine welding, such as welding wheels, butt welds in tanks, etc., has further increased the speed with which joints can be welded besides increasing the quality of the weld.

Besides being valuable in actual constructive work, arc welding has found a large field in reclamation work, saving large amounts annually. Such work would include the rebuilding of incorrectly machined shafts, filling flat places in castings and repairing cracked frames, cylinders and similar iron, or steel parts.

The Toledo Grease Cup

The K. M. Mfg. Co., Toledo, Ohio, recently announced a new positive acting grease cup, known as the Toledo. It is stated that there is no possibility of the grease escaping as it is forced down the plunger stem to the bearing. The action continues until all the grease is used, thus saving refillings. The cup does not fail

The Toledo Grease Cup Forces the Grease to the Bearing

to turn as there are no exposed threads to become injured or to fill up with dirt and grease. With one complete turn the cup is securely locked and cannot be shaken off. Strong compression is given by the axis extending from the outside shell.

Master Favorite Valve Grinders

The New Favorite Mfg. Co., Columbus, Ohio, is introducing three new valve grinders known as Models Number 1, 2 and 3, to meet the specific needs of various service.

Model No. 1, which is especially adapted to the requirements of Ford valves, incorporates the same working arrangement as Model No. 2, which is designed for use on standard cars. Model No. 3 varies somewhat. The feature of the former two models is an oscillating movement, actuated by continuously turning the manually operated handle, which permits the operator to gain access to all the valves of a Ford engine, without being compelled to remove the engine from the car. It is packed in individual cartons, 40 to the case. Weight of case is 59 lb., and the price is $2.25 each.

Model No. 2 differs from Model 1 in that it was designed exclusively for the individual car owner's use. It is finished in gray or black enamel, and comes packed 20 to the case. Weight of case is 40 lb., and the list price is $2.40 each.

Model No. 3 is a service station model, and is also qualified for farm-tractor repair-work. It is sturdily built and designed with an end-thrust ball-bearing adjustable feature, and has a complete oscillating movement by a complete turn of the handle. Four blades are supplied, making it suitable for all grinding purposes. It is finished in enamel, with nickel trimming. It is packed in an individual carton, fifteen grinders to a case. Weight of case is 55 lb. and the list price is $6.

"Favorite" Valve Grinders

The lower illustration shows the No. 2 Favorite Valve Grinder, and the upper illustration is that of the Ford Model or No. 1.

Sentry Coil Protector

The Sentry Coil Protector recently introduced by the Mil-Mac Mfg. Co., 16th St. & Glenwood Ave., Philadelphia, Pa., is a thin sheet of steel that is easily attachable over the top of the dash.

It is provided with a wide and deep gutter in front which protects the coil plugs and the inner side is apron-shaped,

Sentry Coil Protector Attached

terminating in a trough which fits down behind the coil box itself, protecting both sides of the coil box.

Attaching is simple, just requiring the loosening of two nuts, that hold the dash in position to the cowl, and loosening the radiator tie rod. The coil protector is then slid into position, and the friction fabric is then stripped and replaced on top of the coil protector.

It sells for $1.50.

Replacement Table. Corrected Monthly

Including Piston Ring Sizes, Carburetor Sizes, Brake Lining Sizes and Truck Frame Dimensions

Note: Under Carburetor Inlet Diameter will be found either the size of the main air intake or the gasoline fuel line

Name, Model, Tonnage and Year	ENGINE				BRAKE LINING								FRAME	
	Piston Rings		Carburetor		Service				Emergency				Length	Width
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Acason R-1—1918	4	1/4	1	.....	11 1/2	3	1/4	2	11 1/2	3	1/4	2	112	34
Acason RB-1 1/2—1918	4	1/4	1	.....	11 1/2	3 1/2	1/4	2	11 1/2	3 1/2	1/4	2	112	34
Acason H-2 1/2—1915	3	1/4	1 1/4	.....	13 1/2	3 1/2	1/4	2	13 1/2	3 1/2	1/4	2	130	35
Acason L-3 1/2—1915	3	1/4	1 1/4	.....	16	3 3/4	1/4	2	16	3 3/4	1/4	2	156	35
Acason M-5—1915	3	1/4	1 1/4	.....	18	4 1/2	1/4	2	18	4 1/2	1/4	2	167 1/2	35
Ace, Series A1 1/2—1920	3	1/4	1 1/4	1 1/16	12	3 1/4	1/4	4	12	3 1/4	1/4	4	122 1/2	32
Ace, Series A2 1/2—1919-20	3	1/4	1 1/4	1 1/16	13 1/2	3 1/4	1/4	4	13 1/2	3 1/4	1/4	4	144 1/2	32
Ace 3	.....	.....	1 1/4	1/16	51	2 1/4	1/4	2	51	2 1/4	1/4	2	144	32
Acme B-1—1916-20	3	1/4	1 1/4	.....	12	3 1/4	1/4	4	12	3 1/4	1/4	4	110 3/8	34
Acme F-1 1/2—1919-20	3	1/4	1 1/4	.....	12	3 1/4	1/4	4	12	3 1/4	1/4	4	124 3/8	34
Acme A-2—1916-20	3	1/4	1 1/2	.....	14	3 1/2	1/4	4	13	3 1/2	1/4	4	135 1/2	34
Acme C-3 1/2—1917-20	3	1/4	1 1/2	.....	16	3 3/4	1/4	4	15 1/2	3 3/4	1/4	4	150 1/2	36
Acme E-5—1919-20	3	1/4	1 3/4	.....	18	4	1/4	4	18	4	1/4	4	160	37
All-American A-1	3	1/4	1 1/4	2	45	2 1/2	1/4	2	43 1/4	2 1/4	1/4	2	104	31
All-American-1 1/2	.....	.....	1 1/4	2	45	2 1/2	1/4	2	43 1/4	2 1/4	1/4	2	116 7/8	34
All-American-2 1/2	.....	.....	1 1/4	2	.....	.....	.....	.....	.....	.....	.....	.....	Opt	34
Apex C-1	3	1/4	1	.....	42	2	.....	2	41 1/2	2	.....	2	102	35 1/2
Apex D-1 1/2	3	1/4	1	.....	42	2	.....	2	41 1/2	2	.....	2	102	35 1/2
Apex E-2 1/2	3	1/4	1	1 1/4	54	2 1/4	.....	2	53 1/4	2	.....	2	128	31 1/2
Armleder KW 3 1/2—1916-20	4	1/4	1 1/4	1/4	42	3	1/4	1	16	3 1/4	1/4	8	150	36
Armleder HW 2 1/2—1916-20	4	1/4	1 1/4	1/4	13 1/4	3 1/2	1/4	4	13 1/4	3 1/2	1/4	4	140	30
Atco B-1 1/2	4	1/4	1	1	25 1/2	2 1/2	1/4	4	18	2 1/2	1/4	4		32
Atco A-2 1/2	4	1/4	1 1/4	1 1/4	25 1/2	2 1/2	1/4	4	18	2 1/2	1/4	4		33
Atco C-3 1/2	4	1/4	1 1/4	1 1/4	30	2 1/2	1/4	4	22 1/2	2 1/2	1/4	4		34
Atterbury 20R-1 1/2—1920	4	1/4	1	5/8	11 1/4	3 1/4	1/4	4	11 1/4	3 1/4	1/4	4	122 1/2	34
Atterbury 7CX-2 1/2—1919-20	3	1/4	1 1/4	5/8	13 1/4	3 1/2	1/4	4	13 1/4	3 1/2	1/4	4	133 3/8	34
Atterbury 7D-3 1/2—1917-20	3	1/4	1 1/4	5/8	15 5/8	3 3/4	1/4	4	15 5/8	3 3/4	1/4	4	145 5/8	37 1/2
Atterbury 8E-5—1919-20	3	1/4	1 1/2	5/8	17 1/4	4	1/4	4	17 1/4	4	1/4	4	157 1/8	37 1/2
Autocar XXI-F-2—1915-20	4	1/4	1 1/16	.....	16 1/4	2 1/2	1/4	4	13	2 1/2	1/4	4	91	34
Available H-1 1/2—1920	4	1/4	2 1/4	1 1/16	48	2 1/2	1/4	2	36	2 1/2	1/4	2	120	32
Available H2 1/2—1916-20	3	1/4	2 1/4	1 1/16	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	144	32
Available H3—1916-20	3	1/4	2 1/2	1 1/16	16	3 3/4	1/4	4	16	3 3/4	1/4	4	168	36
Available H5—1916-20	3	1/4	2 1/2	1 1/16	18	4	1/4	4	18	4	1/4	4	168	38
Available H7—1919-20	3	1/4	2 1/2	1 1/16	72	3 1/2	1/4	2	72	3 1/2	1/4	2	168	38
Beck-Hawkeye A-1—1912-20	.....	.....	1 1/2	1 1/4	24	2	1/4	1	24	2	1/4	1	114	54
Beck-Hawkeye B-1 1/2—1912-20	.....	.....	1 1/2	1 1/4	24	2	1/4	1	24	2	1/4	1	114	66
Beck-Hawkeye C-2—1912-20	.....	.....	1 3/4	1 1/2	25	2 1/4	1/4	1	25	2 1/4	1/4	1	114	66
Beck-Hawkeye D-3—1920	3	1/4	1 3/4	1 1/2	25	2 1/4	1/4	1	25	2 1/4	1/4	1	136	72
Bell E-1 1/4	.....	.....	1	1/16	39	2	1/4	1	45	3	1/4	1	114	35
Bell O-2 1/2	.....	.....	1 1/4	1/4	48	2	1/4	1	51	3	1/4	1	126	35
Belmont A-1	.....	.....	1	1 1/2	32	2	1/4	2	31	1 1/2	1/4	2	78	34
Belmont B-1 1/2	.....	.....	1	1 1/2	41	2	1/4	2	40	1 1/2	1/4	2	120	36
Belmont C-2	.....	.....	1	1 3/4	41	2 1/2	1/4	2	40	2	1/4	2	124	36
Bessemer G-1—1917-20	3	.....	1	1/4	47 1/2	2 1/2	1/4	2	45 1/2	2 1/4	1/4	2	98	34
Bessemer H2-1 1/2—1917-20	3	.....	1	1/4	56 1/2	2 1/2	1/4	2	55	2 1/4	1/4	2	116	34
Bessemer J2-2 1/2—1919-20	3	.....	1 1/4	1/4	56 1/2	2 1/2	1/4	2	55	2 1/4	1/4	2	141	34
Bessemer K2-4—1919-20	3	.....	1 3/4	1/4	58 1/2	3 1/2	1/4	2	30 1/4	4 1/2	1/4	1	157 1/2	38
Bethlehem K-3/4—1920	3	1/4	1	1/4	49	2	1/4	1	21	2	1/4	2	90	32 1/2
Bethlehem G-1 1/2—1920	3	1/4	1 1/4	1/4	43	2 1/2	1/4	1	40 1/2	1 1/4	1/4	2	120	34 1/2
Bethlehem H-2 1/2—1920	3	1/4	1 1/4	1/4	51	3	1/4	1	49	2	1/4	2	132	34 1/2
Bethlehem J-3 1/2—1920	3	1/4	1 1/4	1/4	55	3	1/4	1	50	2	1/4	2	156	34
Brinton F-2 1/2—1914-20	3	1/4	1 1/16	5/8	13	3 1/2	1/4	2	13	3 1/2	1/4	2	135 1/2	33
Brockway S2-1 1/2—1919-20	3	1/4	1	.....	20	2	1/4	4	20	2	1/4	4	118	32
Brockway K4-2 1/2—1919-20	3	1/4	1 1/4	.....	12	3 5/8	1/4	4	12	3 5/8	1/4	4	142	34
Brockway R2-3 1/2—1919-20	3	1/4	1 1/4	.....	15 5/8	3 3/4	1/4	4	15 5/8	3 3/4	1/4	4	176	36
Brockway T-5—1919-20	3	1/4	1 1/2	.....	18	4	1/4	4	18	4	1/4	4	176	36
Chicago C1 1/2—1919-20	4	.....	1	1 1/2	12 1/2	3 1/4	1/4	4	12 1/2	3 1/4	1/4	4	125	32
Chicago C2 1/2—1919-20	4	.....	1 1/4	1 3/4	13 3/4	3 1/2	1/4	4	13 3/4	3 1/2	1/4	4	142	32
Chicago C3 1/2—1919-20	4	.....	1 1/4	1 3/4	16	3 3/4	1/4	4	16	3 3/4	1/4	4	180	36 3/4
Chicago D5—1920	4	.....	1 1/4	1 3/4	18	4	1/4	4	18	4	1/4	4	180	36 3/4
Clydesdale 120B-5—1919-1920	3	1/4	1 1/4	1/4	18	4	1/4	4	18	4	1/4	4	207	38
Clydesdale 90-3 1/2—1915-20	3	1/4	1 1/2	1/4	16	3 3/4	1/4	4	16	3 3/4	1/4	4	166 1/2	38
Clydesdale 65X-2 1/2—1919-20	3	1/4	1 1/4	1/4	13 1/4	3 1/2	1/4	4	13 1/4	3 1/2	1/4	4	137	33 1/4
Clydesdale 42-1 1/2—1919-20	3	1/4	1 1/4	1/4	12	3 1/4	1/4	4	12	3 1/4	1/4	4	117 1/2	34
Clydesdale 32X1—1919-20	3	1/4	1 1/4	1/4	20	1 3/4	1/4	4	20	1 3/4	1/4	4	117 1/2	34
Collier 18-1—1919-20	.....	.....	1	1/4	15	2 1/4	1/4	4	15	1 1/2	1/4	4	106	35 1/4
Collier 19-1 1/2—1919-20	.....	.....	1	1/4	19 1/2	2 1/4	1/4	4	19 1/2	1 1/2	1/4	4	120	32
Collier 20-2	.....	.....	1 1/4	1/4	19 1/2	2 1/4	1/4	4	19 1/2	1 1/2	1/4	4	132	32
Columbia G-2 1/2—1920	3	1/4	1 1/4	1 1/4	55	3	1/4	2	50	2	1/4	2	132	32 1/2
Columbia F-1—1919-20	3	1/4	1	1 1/16	39 1/4	2 1/2	1/4	2	40 1/2	1 3/4	1/4	2	108	32 1/2
Comet-1 1/2	4	1/4	1	1	17 1/4	2 1/4	1/4	2	17 1/4	1 1/2	1/4	2	100	36
Commerce E 1, 1 1/2	3	1/4	1	1/4	45	2 1/2	1/4	2	43	2 1/4	1/4	2	92 5/8	34
Commerce EP 1 1/2, 2	3	1/4	1	1/4	45	2 1/2	1/4	2	43	2 1/4	1/4	2	99 5/8	34
Concord A-1 1/2—1920	3	1/4	1 1/4	1/4	12	3 1/4	1/4	4	12	3 1/4	1/4	4	110 1/4	32 1/4
Concord B-2 1/2—1920	3	1/4	1 1/4	1/4	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	124 5/8	32 1/4
Conestoga 12	3	1/4	1	1/4	39	2	1/4	1	39	2	1/4	1	86	34
Conestoga 20-1	3	1/4	1	1/4	22	2 1/2	1/4	2	14	2 1/2	1/4	2	96	32
Conestoga 30-2	3	1/4	1	1/4	22	2 1/2	1/4	2	14	2 1/2	1/4	2	120	32
Corbitt E-1—1917-20	3	1/4	1	1/4	19	2	1/4	2	19	2	1/4	2	105	34
Corbitt D-1 1/2—1916-20	3	1/4	1 1/4	1/4	45 1/4	2	1/4	1	35 1/4	2	1/4	1	120	34
Corbitt C-2—1915-20	3	1/4	1 1/4	1/4	51 1/2	2 1/4	1/4	1	51 1/2	2 1/4	1/4	1	138	35
Corbitt B-2 1/2—1916-20	3	1/4	1 1/4	1/4	51 1/2	2 1/4	1/4	1	51 1/2	2 1/4	1/4	1	138	35
Corbitt AA-5—1919-20	3	1/4	1 1/2	1/4	69 1/4	3	1/4	1	69 1/4	3	1/4	1	160	38
Corbitt A-3 1/2—1917-20	3	1/4	1 1/4	1/4	64	2 1/2	1/4	1	64	2 1/2	1/4	1	160	35
Couple Gear HC-3 1/2—1906-20	3	.....	2	1 1/4	48	3	1/4	2	.....	.....	.....	.....	168	42
Couple Gear AC-5—1908-20	3	.....	2	1 1/4	48	3	1/4	.....	.....	.....	.....	.....	168	42
Couple Gear LD-6—1917-20	3	.....	2	1 1/4	48	3	1/4	.....	.....	.....	.....	.....	168	42
Dart H-1—1920	3	1/4	1 1/4	1 1/16	19	1 3/4	1/4	4	19	1 3/4	1/4	4	102	34
Dart S-1 1/2—1920	3	1/4	1 1/4	1 1/16	19	1 3/4	1/4	4	19	1 3/4	1/4	4	112	34
Dart M-2 1/2—1920	3	1/4	1 1/4	1 1/16	10	2 1/2	1/4	2	19	3 1/2	1/4	4	124	34
Dart W-3 1/2—1920	3	1/4	1 1/4	1 1/16	28	2 3/4	1/4	4	28	2 3/4	1/4	4	144	38
Day-Elder A-1	3	1/4	1 1/4	1/4	19	2	1/4	4	19	2	1/4	4	103	35
Day-Elder B-1 1/2	3	1/4	1 1/4	1/4	19	2	1/4	4	19	2	1/4	4	119 3/4	35
Day-Elder D-2	3	1/4	1 1/4	1/4	45	2	1/4	2	45	2	1/4	2	125	35
Day-Elder C-2 1/2	3	1/4	1 1/4	1/4	52	2 1/4	1/4	2	52	2 1/4	1/4	2	125 3/4	35
Day-Elder F-3 1/2	3	1/4	1 1/2	1/4	56 1/2	2 1/2	1/4	2	56 1/2	2 1/2	1/4	2	145 3/4	35
Day-Elder E-5	3	1/4	1 1/2	1/4	69 1/2	3	1/4	2	69 1/2	3	1/4	2	156 3/4	37
Dearborn BW-2—1915-17-19-20	3	.....	1	.....	18	2 1/2	1/4	2	18	1 1/2	1/4	2	130	32
Dearborn F-1 1/2—1915-17-19-20	3	.....	1	.....	16 1/2	2 1/2	1/4	2	16 1/2	1 1/2	1/4	2	96 1/2	34
Dearborn C-1—1915-17-19-20	.....	.....	.....	3/4	38	2	1/4	1	38	2	1/4	1	107	32
Defiance B-1 1/2—1918-19-20	3	1/4	1	.....	45	2 1/2	1/4	1	43 1/4	2 1/4	1/4	1	120	34
Defiance C-2—1918-19-20	3	1/4	1	.....	54 1/16	2 1/2	1/4	1	52 1/2	2 1/4	1/4	1	120	34
De Kalb E2	3	1/4	1 1/4	1 1/4	28	3 1/2	1/4	1	28	3 1/2	1/4	1	120	30
De Kalb E2 1/2	3	1/4	1 1/4	1 1/4	28	3 1/2	1/4	1	28	3 1/2	1/4	1	132	32
Denby 12-1—1920	3	1/4	1	.....	43 1/2	2 1/2	1/4	1	39 1/2	1 3/4	1/4	1	95	34
Denby 134-2—1920	3	1/4	1	.....	51 1/4	2 1/2	1/4	1	47	2	1/4	1	129	34
Denby 25-2 1/2—1920	3	1/4	1 1/4	.....	55 3/4	3	1/4	1	51	2	1/4	1	142	34
Denby 27-3 1/2—1920	3	1/4	1 1/4	.....	61 1/2	3	1/4	1	58	2 1/2	1/4	1	186	34
Denby 210-5—1920	3	1/4	1 1/4	.....	89	2 1/4	1/4	1	89	2 1/4	1/4	1	186	34
Dependable C-1 1/2—1920	4	.....	1	.....	53 1/2	2 1/2	1/4	1	39 1/4	2 1/2	1/4	1	121	33
Dependable E-2 1/2—1920	4	.....	1	.....	62 1/2	2 1/2	1/4	1	48	2 1/2	1/4	1	152	33
Diamond T-FS&T-1 1/2	3	1/4	1	1 1/4	13 1/4	3 1/2	1/4	8	13 1/4	3 1/2	1/4	8	123 1/4	34
Diamond T-U-2	3	1/4	1	1 1/4	13 1/4	3 1/2	1/4	8	13 1/4	3 1/2	1/4	8	132	34
Diamond T-EL	3	1/4	1 1/4	1 1/2	16	3 3/4	1/4	8	16	3 3/4	1/4	8	143	37
Diamond T-S-5	3	1/4	1 1/4	1 1/4	18 1/2	4	1/4	8	18 1/2	4	1/4	8	156 3/8	37
Diamond TK	3	1/4	1 1/4	1 1/2	16	3 3/4	1/4	8	16	3 3/4	1/4	8	145	37
Diehl A	3	.....	1	1	28	2 1/2	1/4	2	27	2	1/4	2	90	.....
Doane 2 1/2—1917-18-19	3	1/4	1 1/4	1/4	34 1/2	3	1/4	2	34	3	1/4	4	126	53
Doane 3 1/2	3	1/4	1 1/4	.....	34 1/2	3	1/4	2	34	3	1/4	4	156	60
Doane 6.—1917-18-19	3	.....	1 1/2	1/4	37 1/2	3	1/4	2	46	4	1/4	4	168	64
Dodge Brothers-1/2—1917-20	3	1/4	1	1/4	19 1/4	2 1/4	1/4	4	14 3/4	1 3/4	1/4	4	47 3/8	38
Dorris K4-4—1918-20	3	1/4	1 1/4	1 1/4	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	142 3/4	34
Dorris K7-3 1/2—1919-20	3	1/4	1 1/4	1 1/4	15 3/4	3 3/4	1/4	4	15 3/4	3 3/4	1/4	4	179 1/2	36
Double Drive B 3	4	1/4	1 1/4	1 3/4	29	2 1/4	1/4	1	29	2 1/4	1/4	1	124	36
Double-Drive B-4	.....	.....	1	.....	13	3	1/4	2	15	3	1/4	2	Opt	.....
Douglas GW-1 1/2	3	.....	1 1/4	1/4	45	2 1/2	1/4	2	44	2 1/2	1/4	2	118	31
Douglas G-1 1/2	3	.....	1 1/4	1/4	46	2 1/2	1/4	2	44	2 1/2	1/4	2	118	31
Douglas H-2	3	.....	1 1/4	1/4	55	2 1/2	1/4	2	52	2 1/2	1/4	2	118	31

Replacement Table—Continued

Name, Model, Tonnage and Year	ENGINE				BRAKE LINING								FRAME	
	Piston Rings		Carburetor		Service				Emergency				Length	Width
	No. per cyl.	Width	Outlet Diameter	Inlet Diameter	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Douglas HW-2	3	....	1¼	¼	54	2½	¼	2	42	2½	¼	2	118	31
Douglas I-3	3	....	1¼	¼	58	2½	¼	2	44	2½	¼	2	132	31
Duplex E-3½	3	¼	1¼	1	9½	2½	¼	2	5½	2½	¼	2	126	39⅜
Duplex A	....	....	1¼	1½	....	2	....	4	....	2	....	4	121	34
Eagle 100-2	4	¼	1	1¼	49½	3	¼	1	47¼	2	¼	1	Opt	36
Ellsworth 25A-½—1918-20	3	⅛	1¼	1¼	12	1¼	¼	4	12	1¼	¼	4	Opt	36
Elmira C1½-2½	....	....	1	1¼	24	1	⅛	1	24	1	⅛	1	60	30
Fageol 1½—1920	3	¼	1	1½	19¼	1¾	⅛	2	19¼	1¾	⅛	2	120	30
Fageol 2½—1917-20	3	¼	1⅛	1⅛	13¼	3½	⅛	2	13¼	3¼	⅛	2	135	34
Fageol 4500.—1917-20	3	¼	1⅛	1⅛	15½	3¾	⅛	2	15½	3¾	⅛	2	161¼	37¾
Fageol 5300.—1917-20	3	¼	1⅝	2	18	4	¼	2	18	4	⅛	2	161¼	37¾
Famous B10-1—1919-20	3	¼	1	⅛	21	2¾	¼	1	48	2	⅛	2	94	34
Famous B12-1½—1919-20	3	⅛	1	⅛	21	2½	¼	1	48	2	⅛	2	94	34
Fargo O17, P18-2, P19-2, P20-2	3	⅛	....	1⅛	52	3	⅛	2	50½	2	⅛	2	132	33
Federal SD-1	4	⅛	1	1⅛	10 11/16	3	¼	4	10 11/16	3	¼	4	112	34
Federal TE-1½	3	⅛	1¼	1½	13	3½	¼	4	13	3½	¼	4	118	34
Federal UE-2	3	⅛	1¼	1½	13	3½	¼	4	13	3½	¼	4	134	34
Federal WD-3½	3	⅛	1¼	1½	15⅝	3¾	¼	4	15⅝	3¾	¼	4	154	38
Federal XD-5	3	⅛	1¼	1½	17 11/16	4	¼	4	17 11/16	4	¼	4	154	38
Federal Light Duty	3	⅛	1¼	1½	13	3½	¼	4	13	3½	¼	4	86	34
Federal Heavy Duty	3	⅛	1¼	1½	15⅝	3¾	¼	4	15⅝	3¾	¼	4	82	38
Ford T-1	3	¼	1⅛	1⅛	23⅜	1⅛	⅛	2	12	1⅝	⅛	2	124	23
Front-Drive C1½	4	⅛	1	1½	13	3	¼	2	15	3	¼	2	124	36
F.W.D. B-3	3	¼	1	⅛	27	3½	¼	1	43	2¾	¼	2	136	36
Garford 25-1¼—1920	3	⅛	1	⅛	11¾	3¼	¼	4	11¾	3¼	¼	4	108	34
Garford 70H-2—1920	4	¼	1¼	⅛	13	3½	¼	4	13	3½	¼	4	121	34
Garford 77D-3½—1920	4	¼	1¼	⅛	13	3½	¼	4	13	3½	¼	4	144	36
Garford 77C-3½—1920	3	¼	1¼	⅛	15⅝	3¾	¼	4	15⅝	3¾	¼	4	150	32
Garford 68-5—1920	3	¼	1¼	⅛	15⅝	3¾	¼	4	15⅝	3¾	¼	4	150	32
Gary F-1	3	⅛	1	¾	10½	4	⅜	2	21⅝	4	¼	2	150	34
Gary GTI-1½	4	¼	1¼	⅜	22½	3	¼	2	22½	3	¼	2	114	34
Gary J-2½	4	¼	1¼	⅜	24	3½	¼	2	24	3½	¼	2	120	34
Gary K-3½	4	¼	1¼	⅜	27	3½	¼	2	27	3½	¼	2	120	34
Gary M-5	4	¼	1½	⅜	32	3¾	¼	2	32	3¾	¼	2	148	36¾
Gersix K-2½—1920	3	¼	1¼	1½	36½	4	¼	2	36½	4	¼	2	168	39
Gersix M-1½—1920	3	¼	1¼	1½	20	2½	¼	4	47	2¼	¼	2	131	34
Giant 15-1	3	⅛	1	....	46	2	¼	2	46	2	⅛	2	114	32
Giant 16-2	3	⅛	1¼	....	19	2	⅛	4	19	2	⅛	4	116½	32
Giant 17-3½	3	⅛	1½	....	45½	2	⅛	2	45½	2	⅛	2	140½	33
G.M.C. 16-¾—1916-20	3	⅛	1	1	56½	2½	¼	2	46½	2½	¼	2	183½	36
G.M.C. 31A-1½—1915-20	3	⅛	1	1	40 11/16	1⅞	¼	4	43⅛	1⅞	¼	4	92½	34
G.M.C. 31B-1½—1915-20	3	⅛	1	1	13⅛	3½	¼	4	13⅛	3½	¼	4	125	33
G.M.C. 41A-2—1915-20	3	⅛	1	1	13⅛	3½	¼	4	13⅛	3½	¼	4	125⅝	33
G.M.C. 41B-2—1915-20	3	⅛	1	1	13⅛	3½	¼	4	13⅛	3½	¼	4	149¾	38
G.M.C. 71A-3½—1916-20	3	⅛	1¼	1¼	15⅝	3¾	¼	4	15⅝	3¾	¼	4	144	38
G.M.C. 71B-3½—1916-20	3	⅛	1¼	1¼	15⅝	3¾	¼	4	15⅝	3¾	¼	4	192	38
G.M.C. 101A-5—1916-20	3	⅛	1¼	1¼	17 11/16	4	¼	4	17 11/16	4	¼	4	144	38
G.M.C. 101B-5—1916-20	3	⅛	1¼	1¼	17 11/16	4	¼	4	17 11/16	4	¼	4	192	38
Gramm-Bernstein 15-1½—1920	3	⅛	1	1½	48½	2	⅛	2	46½	2	⅛	2	120	32
Gramm-Bernstein 65-1½—1920	3	⅛	1	1½	18	1¾	⅛	4	18	1¾	⅛	4	120	32
Gramm-Bernstein 20-2—1920	3	⅛	1¼	1½	22½	2	¼	4	22½	2	¼	4	126	32⅛
Gramm-Bernstein 25-2½—1920	3	¼	1¼	1½	22½	2¼	1¼	4	22½	2¼	¼	4	132	36
Gramm-Bernstein 35-3½—1920	3	¼	1¼	1½	26	2¾	1¼	4	26	2¾	¼	4	144	36
Gramm-Bernstein 50-5—1920	3	¼	1½	1¾	32½	2¾	1¼	4	32½	2¾	¼	4	162	36
Grant 10-1¼—1920	3	⅛	1⅛	....	45	2½	⅛	2	43⅛	2¼	⅛	2	104⅝	35⅛
Grant 11-1½—1920	3	⅛	1⅛	....	45	2½	⅛	2	43⅛	2¼	⅛	2	131⅛	35⅛
Grant 15-2—1920	3	⅛	1⅛	....	54⅛	2½	⅛	2	52⅛	2¼	⅛	2	104⅝	35⅛
Grant 16-2—1920	3	⅛	1⅛	....	54⅛	2½	⅛	2	52⅛	2¼	⅛	2	131⅛	35⅛
Grant 17A—1920	3	⅛	1⅛	....	45	2½	⅛	2	43⅛	2¼	⅛	2	131⅛	35⅛
Hall 2-Worm-2½	3	⅛	....	....	13½	3½	¼	2	13½	3½	¼	2	144	38
Hall 3½-Worm	3	⅛	....	....	16	3¾	¼	2	16	3¾	¼	2	180	39
Hall 5-Worm	3	⅛	....	....	18½	4	¼	2	18½	4	¼	2	144	39
Hall 7-Chain	3	⅛	....	....	37	2½	⅛	1	59	4	¼	1	180	39
Harvey WEA-1½—1919-20	4	¼	....	....	46	2	¼	2	46	2	¼	2	120	32
Harvey WFA-2½—1919-20	4	¼	....	....	52	2¼	¼	2	52	2¼	¼	2	126½	32
Harvey WHA-3½—1919-20	4	¼	....	....	56	2½	¼	2	56	2½	¼	2	144	35
Harvey WKA-5—1919-20	4	¼	....	....	69	3	⅛	2	69	3	⅛	2	144	35
Hawkeye K-1½—1918-20	3	⅛	1¼	1½	48	2	⅛	2	47	1½	⅛	2	112	34
Hawkeye M-2.—1919-20	3	⅛	1¼	1½	54	2½	⅛	2	52	2	⅛	2	112	34
Hendrickson I-2½	3	¼	1¼	⅛	12	3½	⅛	4	12	3½	⅛	4	Opt	32½
Hendrickson J-3½	3	¼	1¼	⅛	16	3¾	⅛	4	16	3¾	⅛	4	Opt	36
Hendrickson K-5	3	¼	1½	⅛	18	4	⅛	4	18	4	⅛	4	Opt	38
Highway-Knight A	4	¼	1½	1¾	57	2½	¼	1	57	2½	¼	1	150	38
Highway-Knight B-5	4	¼	1½	1¾	69	3	¼	1	69	3	¼	1	150	38
Higrade A18-1—1918-19	3	¼	1	1	12	1½	¼	2	12	1½	¼	2	85	32
Higrade B20-1½—1919-20	3	¼	1⅛	1⅛	18	2	¼	2	18	2	¼	2	100	32
Hood C	3	¼	1	⅛	23	1	⅛	2	23	2½	⅛	2	30	23
Hoover 15B-1	3	⅛	1	1¾	16	1¾	⅛	2	16	1¾	⅛	2	82	35½
Hoover 20A-1½	3	⅛	1	1¾	19	2	⅛	2	19	2	⅛	2	105	33
Huffman B-1½—1919-20	3	⅛	1	⅛	44	2¼	⅛	2	44	1½	⅛	2	123	32
Huffman C-1½—1919-20	3	⅛	1	⅛	46	2½	⅛	2	44	2¼	⅛	2	123	32
Hurlburt A1½-2	....	....	1¼	1	22	2	¼	2	22	2	¼	2	132	35½
Hurlburt B2½	3	⅛	1¼	1	24	2½	¼	2	23	2½	¼	2	154	34
Hurlburt C3½-4	3	⅛	1½	1¼	26	3	¼	2	25	3	¼	2	144½	34
Hurlburt D5-5½	3	¼	1½	1¼	28	3	¼	2	27	3	¼	2	144½	34
Indiana 12-1¼—1920	3	¼	1	....	17½	2	⅛	8	17½	2	⅛	8	108	32
Indiana 20-2—1920	3	¼	1¼	....	44	2	¼	4	44	2	¼	4	126	33
Indiana 25-2½—1920	3	¼	1¼	....	51	2¼	¼	4	51	2¼	¼	4	138	33
Indiana 35—1920	3	¼	1¼	....	56	2¼	¼	4	56	2½	¼	4	144	34½
Indiana 50-5—1920	3	¼	1¼	....	68	3	¼	4	68	3	¼	4	156	37½
International H-¾—1916-20	3	¼	1¼	1¾	43¾	2¼	¼	2	43¾	2¼	¼	2	75 11/16	34
International F-1—1916-20	3	¼	1¼	1¾	43¾	2¼	¼	2	43¾	2¼	¼	2	88 11/16	34
International K-1½—1918-20	3	¼	1¼	1¾	50⅝	2¼	¼	2	50⅝	2¼	¼	2	92 11/16	34
International G-2—1918-20	4	¼	1¼	1¾	50⅝	2¼	¼	2	50⅝	2¼	¼	2	118½	34
International L-3½—1920	4	¼	1¼	1¾	73⅛	2½	¼	2	73⅛	2½	⅛	2	147⅞	34
Jackson B-3½	3	⅛	1¼	2	51¾	3½	¼	2	....	....	....	....	150	36
Jones 31A-1	3	⅛	1	⅛	41 11/16	2½	¼	2	39¼	1¾	¼	2	100½	36
Jumbo 15-1½—1919	4	¼	....	1	48½	2	¼	2	47	1½	⅛	2	120	32
Jumbo 20-2—1919	4	¼	....	1	48½	2	¼	2	47	1½	⅛	2	120	32
Jumbo 25-2½—1917-19	3	¼	....	1¼	49¾	3	⅛	2	47½	2½	⅛	2	116	34
Jumbo 30-3—1917-19	3	¼	....	1¼	49¾	3	⅛	2	47½	2½	⅛	2	116	34
Jumbo 35-3½—1919	4	¼	....	1½	60½	3	⅛	2	58½	2½	⅛	2	144	36
Jumbo 40-4—1919	4	¼	....	1¼	60½	3	⅛	2	58½	2½	⅛	2	144	36
Kalamazoo G-1½	3	¼	1	1⅛	50	2½	⅛	1	....	2½	⅛	1	120	32½
Kalamazoo H-2½	3	¼	2	1⅛	90	2½	⅛	1	48	2½	⅛	1	144	33
Kalamazoo K-3½	3	¼	2	1⅛	60	2½	⅛	1	60	2½	⅛	1	152	36
Kankakee E-2½—1919-20	3	¼	1	1¼	50	3	⅛	1	46½	2	⅛	1	148½	36
Keldon 19-2	4	¼	1¼	1¼	48	3	⅛	1	45	3	⅛	1	132	34
Kelly-Springfield K31-1½	4	¼	1	⅛	16¾	1⅞	⅛	4	16¾	1⅞	⅛	4	141	34
Kelly-Springfield K32-1½	4	¼	1	⅛	42⅝	2	¼	2	42⅝	2	¼	2	141	34
Kelly-Springfield K35-2½	4	¼	1	⅛	16¾	1⅞	⅛	4	16¾	1⅞	⅛	4	141	34
Kelly-Springfield K36-2½	4	¼	1	⅛	48⅞	2¼	¼	2	48⅞	2¼	¼	2	141	34
Kelly-Springfield K40-3½	4	¼	1¼	⅛	21	2⅛	⅛	4	21	2⅛	⅛	4	145	38
Kelly-Springfield K45-4	4	¼	1¼	⅛	21	2⅛	⅛	4	21	2¾	⅛	4	145	38
Kelly-Springfield K50-5	4	¼	1¼	⅛	21	2⅛	⅛	4	21	2¾	⅛	4	145	38
Kelly-Springfield K60-6	4	¼	1¼	⅛	21	2⅛	⅛	4	21	2¾	⅛	4	145	38
Keystone 40-2—1919-20	3	¼	1	⅛	50½	3	⅛	1	46¾	2	⅛	1	124	33
Keystone-1—1920	3	¼	1	¼	41¾	2	⅛	1	41¼	2	⅛	1	95	33
Kimball AB-1½	3	¼	1¼	....	50	2¼	¼	4	33	3½	¼	1	135	34
Kimball AC-2½	3	¼	1¼	....	52	2½	¼	4	33	3½	¼	1	152	34
Kimball AK-3	3	¼	1½	....	58	3	¼	2	58	3	¼	2	171	36
Kimball AE-4	3	¼	1½	....	65	3	¼	2	65	3	¼	2	171	36
Kimball AF-5	3	¼	1½	....	48	3¼	¼	4	48	3¼	¼	4	Opt	32
King-Zeitler 1½—1919-20	3	⅛	1	1¼	54	3½	¼	4	54	3½	¼	4	Opt	32
King-Zeitler 2½—1919-20	3	⅛	1	1¼	63	3¾	¼	4	63	3¾	¼	4	Opt	36
King-Zeitler 3½—1919-20	3	⅛	1¼	1¼	44¼	2	⅛	2	44¼	2	⅛	2	96	33½
Kissel-Delivery-1¼—1920	3	⅛	....	1¼	19	2	¼	4	19	2	¼	4	120	34
Kissel-Utility-1½—1917-20	3	⅛	....	1¼	14	3½	¼	4	14	3½	¼	4	144	34
Kissel-Freighter-2—1917-20	3	⅛	....	1¼	56	2½	⅛	2	56	2½	⅛	2	156	36
Kissel-Heavy-Duty-3½—1917-20	3	⅛	....	1¼	56	2½	⅛	2	56	2½	⅛	2	168	36
Kissel-Goliath-5—1919-20	....	....	....	1¼	....	....	....	....	....	....	....	....	120	34
Kleiber 1	....	....	....	1¾	....	....	....	....	....	....	....	....	132	34
Kleiber 1½	....	....	....	1¾	....	....	....	....	....	....	....	....	144	34
Kleiber 2	....	....	....	1¾	....	....	....	....	....	....	....	....	150	34
Kleiber 2½	....	....	....	1¾	....	....	....	....	....	....	....	....	156	34
Kleiber 3½	....	....	....	1¾	....	....	....	....	....	....	....	....	168	38
Kleiber 5	....	....	....	1¾	....	....	....	....	57¾	6½	¼	1	27 ⅛	38
Knox 35—1915-20	4	¼	1½	....	....	....	....	....	....	....	....	....	....	....

Name, Model, Tonnage and Year	ENGINE				BRAKE LINING								FRAME	
	Piston Rings		Carburetor		Service				Emergency				Length	Width
	No. per cyl.	Width	Outlet Diameter	Inlet Diameter	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Knox 36-3—1915-20	4	1/4	1 1/2						57 3/4	6 1/2	1/4	1	96 7/8	28
Koehler C 1¼—1919-20	3	1/8	1	1/4	47	2 1/2	1/8	2	46	2 1/4	1/8	2	108	34
Koehler M 2½—1919-20	4	1/8	1 1/4	1/8	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	144	34
Lange-2	3	1/8	1	1 5/8	30	2	1/4	2	18	3	1/4	4	114	37
Larrabee-Deyo U-1½—1919-20	3	1/8	1		48	2	1/4	2	48	2	1/4	2	108	34
Lar.-Deyo A, B '18-19 & L-'20-3½	3	1/8	1 1/4		60	2 1/2	1/4	2	60	2 1/2	1/4	2	168	36
Lar.-Deyo C, D'18-19 & K'20-2½	3	1/8	1 1/4		54	2 1/4	1/4	2	54	2 1/4	1/4	2	150	36
Larrabee-Deyo W-5—1920	3	1/8	1 1/2		72	3	1/4	2	72	3	1/4	2	152	36
Larrabee-Deyo T—1918-19	3	1/8	1 1/4		72	3	1/4	2	72	3	1/4	2	157	36
L. M. C.-2½—1919-20	3	1/8	1 1/8	1 1/8	55	3	1/8	2	50 1/2	2	1/8	2	143	32
Lombard 140H.P.	3												120	79
Luedinghaus K2—1919-20	3	1/4	1 1/4	1 1/4	53.4	2 1/2	1/4	2	38 1/2	2 1/2	1/4	2	120	34
Luedinghaus K2-LS—1920	3	1/4	1 1/4	1 1/4	53.4	2 1/2	1/4	2	38 1/2	2 1/2	1/4	2	145 1/2	34
Luverne BBL-2	3	1/8	1 1/4	1 1/4		2 1/2	1/4	2		2 1/2	1/4	2	108	34
Maccar S-1—1920	3	1/8	1	1/8	10 1/4	3	1/4	4	10 1/4	3	1/4	4	117 1/2	33
Maccar L-1¼—1915-19	3	1/8	1 1/4	1/8	11 1/8	3 1/4	1/4	4	11 1/8	3 1/4	1/4	4	128 1/2	34
Maccar H-2½—1915-20	3	1/8	1 1/4	1/8	13	3 1/2	1/4	4	13	3 1/2	1/4	4	143 1/2	34
Maccar M-3½—1915-17-19-20	3	1/8	1 1/4	1/8	15 1/4	3 3/4	1/4	4	15 1/4	3 3/4	1/4	4	155 3/8	34
Maccar G-5½	3	1/4	1 1/2	1/8	17 3/4	4	1/4	4	17 3/4	4	1/4	4	167	37 1/4
Mack AB 1½, 2 Ton-Chain '16-20	3	1/8	1 1/4	1/4	12 1/4	4	1/4	2	16 1/2	2 1/2	1/4	4	Opt	33 1/4
Mack AB 1½, 2 Ton-Worm '16-20	3	1/8	1 1/4	1/4	13 1/8	3 1/2	1/4	4	13 1/8	3 1/2	1/4	4	Opt	33 1/4
Mack AB-Tractor 5 Ton—'16-20	3	1/8	1 1/4	1/4	12 1/4	4	1/4	2	16 1/2	2 1/2	1/4	4	77	33 1/4
Mack AC 3½ to 7½ Ton—'16-20	4	1/4	1 1/2	1/4	16 1/8	3	1/4	4	20 1/2	3 1/2	1/4	4	Opt	37 1/2
Mack AC Trac. 7to15Ton—'16-20	4	1/4	1 1/2	1/4	16 1/8	3	1/4	4	20 1/2	3 1/2	1/4	4	87	37 1/2
Master JI-1½—1919-20	3	1/8	1 1/4	2	74 1/2	2 1/2	1/8	1	74 1/2	2 1/4	1/4	1	117 3/4	34 1/8
Master JW-1½—1919-20	3	1/8	1 1/4	2	12	3 1/4	1/4	2	12	3 1/4	1/4	2	117 3/4	34 1/8
Master M-2½—1916-20	3	1/4	1 1/2	2	74 1/2	2 1/2	1/8	1	74 1/2	2 1/4	1/4	1	117 3/4	34
Master O-2½—1917-20	3	1/4	1 1/2	2	74 1/2	2 1/2	1/8	1	74 1/2	2 1/4	1/4	1	156 3/8	34
Master W-2½—1916-20	3	1/4	1 1/2	2	13 1/4	3 1/2	1/4	2	13 1/4	3 1/2	1/4	2	117 3/8	34
Master WL-2½—1917-20	3	1/4	1 1/2	2	13 1/4	3 1/2	1/4	2	13 1/4	3 1/2	1/4	2	156 3/8	34
Master T-6 Tractor—1917-20	3	1/4	1 1/2	2	74 1/2	2 1/2	1/8	1	74 1/2	2 1/4	1/4	1	72 1/8	34
Master A-3½—1918-20	4	1/4	1 1/2	1 3/4	16	3 3/4	1/4	2	16	3 3/4	1/4	2	147 3/4	36 3/4
Master AL-3½—1918-20	4	1/4	1 1/2	1 3/4	16	3 3/4	1/4	2	16	3 3/4	1/4	2	183 3/4	36 3/4
Master B-5—1919-20	4	1/4	1 1/2	1 3/4	18	4	1/4	2	18	4	1/4	2	162 1/8	39
Master BL-5—1919-20	4	1/4	1 1/2	1 3/4	18	4	1/4	2	18	4	1/4	2	186 1/8	39
Maxwell 1½1917-20	3	1/8	1	1	16	1 3/4	1/8	8	16	1 3/4	1/8	8	102	36
Menominee HT-1—1918-20	3	1/8	1	1 1/2	12	3 1/4	1/4	8	....	....	....	....	104	32
Menominee H-1½—1916-20	3	1/8	1 1/4	1 3/4	13 1/4	3 1/2	1/4	8	....	....	....	....	122	32
Menominee D-2.—1915-20	3	1/8	1 1/4	1 3/4	13 1/2	3 1/2	1/4	8	....	....	....	....	146	32
Menominee G-3½—1916-20	3	1/4	1 1/2	2	16	3 1/2	1/4	8	....	....	....	....	155	36
Menominee J-5—1917-20	3	1/8	1 1/2	2	18 1/2	4	1/4	8	....	....	....	....	156	38
Menominee Ht-1—1920-late	3	1/8	1	1 1/2	47 1/8	2 1/2	1/8	2	33 1/4	2 1/2	1/8	2	104	32
Menominee H-1—1920-late	3	1/8	1 1/4	1 3/4	47 1/8	2 1/2	1/8	2	33 1/4	2 1/2	1/8	1	122	32
Menominee D-2—1920-late	3	1/8	1 1/4	1 3/4	57 1/2	2 1/2	1/8	2	42 1/2	2 1/2	1/8	2	146	32
Menominee G-3½—1920-late	3	1/4	1 1/2	2	57 1/2	2 1/2	1/8	2	42 1/2	2 1/2	1/8	2	155	36
Menominee J-5—1920-late	3	1/8	1 1/2	2	69 1/8	3 1/2	1/4	2	52	2 1/2	1/8	2	156	38
Moreland 19B-1½—1918-19	3	1/8	1 1/4	1 3/4	12	3 3/4	1/4	4	12	3 1/4	1/4	4	132	34
Moreland 19C-2½—1918-19	3	1/8	1 1/2	1 3/4	13 1/2	3 1/2	1/4	4	13 1/2	3 1/2	1/4	4	156	34
Moreland 19G-4—1918-19	3	1/4	1 1/2	1 3/4	16	3 3/4	1/4	4	16	3 3/4	1/4	4	168	38
Moreland 19J-5—1918-19	3	1/4	1 1/2	1 3/4	18	4	1/4	4	18	4	1/4	4	168	38
Muskegon 20-2	3	1/8	1 1/4	2	54	2 1/4	1/8	2	53	2 1/4	1/8	2	119 1/2	34
Mutual-2—1919-20	3	1/4	1 1/8	1 1/4	51	2 1/4	1/4	2	51	2 1/4	1/4	2	128 3/4	34
Mutual 2A—1919-20	3	1/4	1 1/8	....	51	....	....	2	51	....	....	....	128 3/4	34
Napoleon 9-1—1919-20	3	1/4	1	1/8	44	2	1/8	1	30	2 1/2	1/8	1	102	35
Napoleon 11-1½—1919-20	3	1/4	1	1/8	49	2	1/8	1	30	2 1/2	1/8	1	102	35
Nash 2018-1—1919-20	4	1/4	1 1/4	1 1/4	49 1/8	2	1/8	2	20 1/8	2 1/2	1/8	1	104 1/2	30 1/2
Nash 3018-2—1919-20	4	1/4	1 1/4	1 1/4	50 3/8	3	1/8	2	20 1/8	2 1/2	1/8	1	118 3/4	31 3/4
Nash 4017-2—1919-20	3	1/4	1 1/4	1 1/4	49 1/4	2 1/2	1/4	4	25 1/8	2 1/2	1/4	1	117 1/4	38 1/4
Nelson & LeMoon F1	3	1/8	1 1/4	1/8	12	3 1/4	1/4	2	12	3 1/4	1/4	2	Opt	.....
Nelson & LeMoon F1½	3	1/8	1 1/4	1/8	12	3 1/4	1/4	2	12	3 1/4	1/4	2	Opt	.....
Nelson & LeMoon F2	3	1/8	1 1/4	1/8	12	3 1/4	1/4	2	12	3 1/4	1/4	2	Opt	.....
Nelson & LeMoon F3½	3	1/4	1 1/4	1/8	16 1/2	3 1/4	1/4	2	16 1/2	3 1/4	1/4	2	Opt	.....
Nelson & LeMoon F5	4	1/4	1 1/2	1/8	18	4	1/4	2	18	4	1/4	2	Opt	.....
Netco D-2	3	1/8	1 1/4	1 1/8	12	3 1/4	1/4	4	12	3 1/2	1/4	4	116	34
Netco H-2½	3	1/8	1 1/2	1 1/8	13	3 1/2	1/4	4	13	3 1/2	1/4	4	144	34
Niles E-2	3	1/8	1 1/4	1 1/4	12	3 1/4	1/4	2	12	3 1/4	1/4	2	114	.....
Noble A20-1—1919-20	4	1/8	1	....									124	34
Noble B30-1½—1918-20	4	1/8	1	1 1/8	45	2	1/4	2	45	2	1/4	2	136	34
Noble C40-2—1919-20	4	1/4	1 1/4	1 1/8	45	2	1/4	2	45	2	1/4	2	148	34
Noble D50-2½—1919-20	4	1/4	1 1/2	1 1/8	51	2 1/4	1/4	2	51	2 1/4	1/4	2	172	34
Noble E70-3½—1919-20	4	1/4	1 1/4	1 1/8	56	2 1/2	1/4	2	56	2 1/2	1/4	2	172	36
Northway B2-2	3	1/8	1 1/8	1 1/4	50 1/2	2 1/4	1/4	2	50 1/2	2 1/4	1/4	2	133	33

Name, Model, Tonnage and Year	ENGINE				BRAKE LINING								FRAME	
	Piston Rings		Carburetor		Service				Emergency				Length	Width
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Northway B3-3½	3	1/8	1 1/8	1 1/4	54	2 1/2	1/4	2	54	2 1/2	1/4	2	148	34 1/2
O. K.-1½—1920	3	1/8	1 1/4	....	43	2 1/2	1/8	1	58	2 1/2	1/8	1	125	35
O. K.-2½—1920	3	1/8	1 1/4	....	43	2 1/2	1/8	1	58	2 1/2	1/8	1	125	35
Old Hickory W-1—1919	3	1/8	1 1/8	1	24	2 1/4	1/4	2	24	2 1/4	1/4	2	120	36
Old Reliable A-1¼—1918-20	3	1/4	1 1/4	1 1/4	48	2 1/2	1/4	1	48	2 1/2	1/4	1	105	32
Old Reliable B-2½—1918-20	3	1/4	1 1/4	1 1/4	54	2	1/4	1	54	2	1/4	1	144	32
Old Reliable C-3½—1918-20	3	1/4	1 1/4	1 1/4	60	2 1/2	1/4	1	60	2 1/2	1/4	1	150	32
Old Reliable D-5—1918-20	3	1/4	1 1/2	1 1/2	72	2 1/2	1/4	1	72	2 1/2	1/4	1	156	34
Old Reliable K, L, M-7—1918-20	3	1/4	1 1/2	1 1/2	54	3 1/2	1/4	1	60	4	1/4	1	158	36
Oldsmobile T-¾—1919-20	3	1/8	1	1/8	42 1/4	2	1/8	1	41 1/8	2	1/8	1	92 5/8	34
Oneida A 9-1¼	3	1/8	1	....	48	2 1/2	1/8	2	34	2 1/2	1/8	2	106	34
Oneida B 9-1¾	3	1/8	1 1/4	....	48	2 1/2	1/8	2	34	2 1/2	1/8	2	114	34
Oneida C 9-2½	3	1/8	1 1/2	....	58	2 1/2	1/8	2	43	2 1/2	1/8	2	138	34
Oneida D 9-3½	3	1/4	1 1/4	....	15 5/8	3 3/4	1/4	4	16	4	1/4	4	157	36
Oneida E 9-5	3	1/4	1 1/4	....	18	4	1/4	4	18	4	1/4	4	178	38
Oshkosh A-2	3	1/8	1 1/4	2	23 1/8	3	1/4	1	43 1/8	2 1/2	1/8	2	108 1/8	34
Oshkosh AA-2	3	1/8	1 1/4	2	23 1/8	3	1/4	1	43 1/8	2 1/2	1/8	2	143 1/8	34
Packard B., E	3	1/4	1 1/8	1 1/4	7 11/16	4 1/4	1/4	2	14	2	1/8	2	126	31 1/4
Packard C., E	3	1/4	1 1/8	1 1/4	7 11/16	4 1/4	1/4	2	14	2	1/8	2	132	31 1/4
Packard D., E	3	1/4	1 1/8	1 1/4	9 1/8	4 1/4	1/4	2	17	3	1/8	2	144	39
Packard E., E	3	1/4	1 1/8	1 1/4	9 1/8	4 1/4	1/4	2	18 1/4	3	1/8	2	144	39
Packard F., E	3	1/4	1 1/8	1 1/4	9 1/8	6 1/2	1/4	2	18 1/4	3 1/2	1/8	2	144	39
Packard G., E	3	1/4	1 1/8	1 1/4	9 1/8	6 1/2	1/4	2	18 1/4	3 1/2	1/8	2	144	39
Paige 50-18-2½	3	1/8	....	1 1/4	48 1/8	2 1/4	1/4	2	48 1/8	2	1/4	2	126	33
Paige 51-18-3½	3	1/8	....	1 1/4	15 5/8	3 1/4	1/4	4	15 5/8	3 1/4	1/4	4	144	35
Paige 52-19-1½	3	1/8	....	1 1/4	11 1/2	3 1/4	1/4	4	11 1/2	3 1/4	1/4	4	126	33
Parker F20-2—1920	3	1/4	1 1/4	1 1/2	10 3/4	5	1/4	2	19	2 1/2	1/4	4	127	33
Parker J20-3½—1920	3	1/4	1 1/4	1 1/2	10 3/4	5	1/4	2	19	3 1/2	1/4	4	139 1/2	33
Parker M20-5—1920	3	1/4	1 1/2	1 1/4	10 3/4	5	1/4	2	24 1/2	4	1/4	4	145	37
Patriot Lincoln-2	3	1/8	1 1/8	1 1/8	41	1 3/4	1/8	2	41	1 3/4	1/4	2	112	34
Patriot Revere-1	3	1/8	1 1/8	1 1/8	41	1 3/4	1/4	2	41	1 3/4	1/4	2	92 1/2	33 1/4
Patriot Washington-3	3	1/8	1 1/8	1 1/8	55	2 3/4	1/4	2	55	2 3/4	1/4	2	150	34
Pierce-Arrow 5	3	1/8	1 1/8	1 3/4	7 3/4	3 1/2	1/8	2	18	4	1/8	4	144 1/8	38 1/2
Pierce-Arrow 2	4	1/4	1 1/2	1 1/2	8 1/4	5	1/8	2	18 11/16	3	1/8	4	126 11/16	34 1/2
Pittsburgher 2½—1919-20	3	1/8	1 1/4	1 1/4	44	2 1/4	1/4	2	44	2 1/4	1/4	2	136	33
Pony ¼	3	1/8	1/8	1/8	....	....	....	....	10	1 1/2	1/8	2	40	24
Pony 2	3	1/4	1 1/4	1 1/2	....	....	....	....	....	....	....	....	132	33
Pony 3½	4	1/4	1 1/4	1 1/2	....	....	....	....	....	....	....	....	156	36
Rainier R6-1½	3	1/8	1 1/8	1/8	19	2	1/8	2	19	2	1/8	2	102	34
Rainier R9	3	1/8	1 1/8	1/8	19	2	1/8	2	19	2	1/8	2	102	34
Rainier R11-3½	3	1/8	1 1/8	1/8	11 1/4	3	1/8	2	11 1/4	3	1/8	2	87 3/4	34
Reliance A10-1½—1920	3	1/4	1 1/4	1/4	17	2	1/8	4	17	2	1/8	4	122	32
Reliance B20-2½—1920	3	1/4	1 1/4	1/8	17	2	1/8	4	17	2	1/8	4	127	32
Reo F—1500-lbs	3	1/8	1	1	43	2 1/4	1/8	1	31 1/2	2	1/8	2	82	30
Republic 10-1—1919-20	3	1/8	1	....	45	2 1/2	1/8	2	43	2 1/4	1/8	2	98	34
Republic 11X-1½—1919-20	3	1/8	1	....	54 3/4	2 1/2	1/8	2	52 1/2	2 1/4	1/8	2	118	34
Republic 19-2½—1919-20	3	1/8	1 1/4	....	54 3/4	2 1/2	1/8	2	52 1/2	2 1/4	1/8	2	121	34
Republic 20-3½—1919-20	3	1/4	1 1/4	....	55 3/4	3 1/2	1/8	2	31	4 1/2	1/8	1	146	37
Reynolds 3A-1½	3	1/8	1 1/4	....	46	2	1/4	2	46	2	1/4	2	121	33
Reynolds 5A-2½	3	1/8	1 1/4	....	52 1/2	2 1/4	1/4	2	52 1/2	2 1/4	1/4	2	126	33
Reynolds 7A-3½	3	1/8	1 1/4	....	57	2 1/2	1/4	2	57	2 1/2	1/4	2	148	37
Reynolds 10A-5	3	1/8	1 1/4	....	70	3	1/4	2	70	3	1/4	2	148	37
Riker B3, BB-4	5	1/4	....	....	7 3/4	4 1/2	1/8	2	20	4	1/8	4	150	38
Rowe CW-1½—1918-19	....	....	1	1/8	19	2	1/8	8	19	2	1/8	8	121 1/2	33
Rowe CDW2—1916-20	4	1/4	1 1/4	1/8	45	2	1/4	4	45	2	1/4	4	123	33
Rowe CDW2½—1918-20	4	1/4	1 1/4	1/8	51 1/2	2 1/4	1/4	4	51 1/2	2 1/2	1/4	4	147	33
Rowe DEW3½—1918-20	4	1/4	1 1/2	1/8	56 1/2	2 1/2	1/4	4	56 1/2	2 1/2	1/4	4	150	36
Rowe FW5—1914-20	4	1/4	1 1/2	1/8	68	3	1/8	4	68	3	1/8	4	156	38 1/2
Rowe GW3—1916-17, 1919	3	1/8	1 1/4	1/8	....	....	....	....	....	....	....	....	144	33
Sandow G-1—1918-20	3	1/8	1	1/8	20	2	1/8	2	20	2	1/8	2	96	34
Sandow CG-1½—1918-20	3	1/8	1	1/8	20	2	1/8	2	20	2	1/8	2	120	34
Sandow I-2—1918-20	3	1/8	1	1/8	60	3	1/8	1	60	3	1/8	1	132	32
Sandow J-2½—1918-20	3	1/8	1 1/4	1/8	13 1/2	3 1/2	1/4	2	16	3 1/2	1/4	2	144	37
Sandow L-5—1918-20	3	1/8	1 1/2	1/8	24	4 1/2	1/4	2	24	4 1/2	1/4	2	144	37
Sandow M-3½—1918-20	3	1/8	1 1/4	1/8	18 1/2	4	1/4	2	18 1/2	4	1/4	2	144	37
Sanford 25-2½—1917-20	3	1/8	1 1/4	1 1/4	51 1/2	2 1/4	1/4	1	51 1/2	2 1/2	1/4	1	144	35
Sanford W35-3½—1917-20	3	1/8	1 1/4	1 1/4	56	2 1/2	1/4	1	56	2 1/2	1/4	1	145	35
Sanford W50-5—1917-20	3	1/8	1 1/4	1 1/4	69	3	1/4	1	69	3	1/4	1	145	35
Schacht 2	3	1/4	1 1/8	....	8 1/2	3 1/4	1/4	4	13 1/2	3	1/4	4	140	35 1/4
Schacht 2½	3	1/4	1 1/8	....	8 1/2	3 1/4	1/4	4	13 1/2	3	1/4	4	140	35 1/4
Schacht 3½	4	1/4	1 1/8	....	8 1/2	3 1/2	1/4	4	13 1/2	3	1/4	4	152	35 1/4
Schacht 5	4	1/4	1 1/8	....	8 1/2	3 1/2	1/4	4	15	4	1/4	4	152	35 1/2

Replacement Table—Continued

Name, Model, Tonnage and Year	ENGINE				BRAKE LINING								FRAME	
	Piston Rings		Carburetor		Service				Emergency				Length	Width
	No. per Cyl.	Width	Outlet Diameter	Inlet Diameter	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Selden 1½A—1919–20	3	1/8	1	1 1/16	11 11/16	3¼	1/8	2	11 11/16	3¼	....	2	114	34
Selden 2½A—1919–20	3	1/8	1	1 1/16	13 3/16	3½	1/8	2	13 3/16	3½	....	2	134	34
Selden 3½A—1919–20	3	1/8	1¼	1 1/16	15¾	3¾	1/8	2	15¾	3¾	1/8	2	153	37 1/16
Selden 5A—1920	3	¼	1½	1 1/16	18	4	1/8	2	....	4	1/8	2	153	37½
Service 220–1—1919–20	3	1/8	1 1/16	1 1/16	12	3¼	¼	2	12	3¼	¼	2	109½	34
Service 31–1½—1919–20	3	¼	1 1/16	1 1/16	12	3¼	¼	2	12	3¼	¼	2	121 1/16	34
Service 36–1½—1919–20	3	¼	1 1/16	1 1/16	12	3¼	¼	2	12	3¼	¼	2	121 1/16	34
Service 51–2½—1919–20	3	¼	1 1/16	1 1/16	13½	3½	¼	2	13½	3½	¼	2	131 1/8	34
Service 71–3½—1919–20	3	¼	1 1/16	1 1/16	16	3¾	¼	2	16	3¾	¼	2	150¼	38
Service 76–3½—1919–20	3	¼	1 1/16	1 1/16	16	3¾	¼	2	16	3¾	¼	2	145¾	38
Service 101–5—1919–20	3	¼	1 1/16	1 1/16	18½	4	¼	2	18½	4	¼	2	145¾	38
Shaw M2—1918–20	....	....	1	1/8	49	2½	¼	2	45	2½	¼	2	60	43
Shaw M4—1918–20	....	....	1	1/8	11	3	¼	4	11	3	¼	4	92	32
Signal F-1	3	1/8	1 1/16	1 1/16	12	3¼	¼	2	12	3¼	¼	2	120	34
Signal H-1½	3	1/8	1 1/16	1 1/16	12	3¼	¼	2	12	3¼	¼	2	120	34
Signal J-2½	3	1/8	1 1/16	1 1/16	13½	3½	¼	2	13½	3½	¼	2	126	34
Signal M 3½	3	1/8	1 1/16	1 1/16	16	3¾	¼	2	16	3¾	¼	2	168	38
Signal R-5	3	¼	1 5/8	1 7/8	18	4	¼	2	18	4	¼	2	172	38
Standard 56-1	3	1/8	1 1/16	1 1/16	10 7/8	3	¼	4	10 7/8	3	¼	4	120	32
Standard 76–2½	3	1/8	1¼	1 1/16	13 1/8	3½	¼	4	13 1/8	3½	¼	4	122	32
Standard 66–3½	3	1/8	1¼	1 1/16	15 5/16	3¾	¼	4	15 5/8	3¾	¼	4	144	38
Standard 86-5	3	1/8	1¼	1 1/16	17 11/16	4	¼	4	17 11/16	4	¼	4	144	38
Sterling 1½—1920	3	¼	1¼	1/8	11 5/8	3¼	¼	8	11 5/8	3¼	¼	8	120	33½
Sterling 2—1920	3	¼	1¼	1/8	13 1/16	3½	¼	8	13 3/8	3½	¼	8	120	33½
Sterling 2½—1920	3	¼	1¼	1/8	13 1/8	3½	¼	8	13 3/8	3½	¼	8	138	34
Sterling 3½—1920	3	¼	1¼	1/8	15½	3¾	¼	8	15½	3¾	¼	8	144	38
Sterling 5-Worm—1920	3	¼	1¼	1/8	18	4	¼	8	18	4	¼	8	158	38
Sterling 5-Chain—1920	3	¼	1¼	1/8	56½	3½	¼	2	28¾	4	¼	1	158	38
Sterling 7½—1920	3	¼	1¼	1/8	56½	3½	¼	2	28¾	4	¼	1	158	38
Stewart M7–2—1918–20	3	1/8	.....	1 1/16	50 5/8	2	1/8	2	8	5	1/8	2	132¾	32
Stewart M12–1—1920	3	1/8	.....	1	41 5/8	2	1/8	2	22¾	2	1/8	1	99½	32
Stewart M9–1½—1918–20	3	1/8	.....	1	48½	2	1/8	2	8	5	1/8	2	119¼	32
Stewart M10–3½—1918–20	3	1/8	.....	1 3/16	60	3	1/8	2	8	5	1/8	2	139¾	32
Stewart M11–¾—1919–20	3	1/8	.....	1/8	41 5/8	2	1/8	2	22¾	2	1/8	1	77¼	32
Stewart M7X—1920	3	1/8	.....	1 1/16	50 5/8	2	1/8	2	8	5	1/8	2	132½	32
Stewart M10X—1920	3	1/8	.....	1 3/16	60	3	1/8	2	8	2	1/8	2	139	32
Stoughton R–1½	3	....	1	1 3/16	19	2	¼	2	19	2	¼	2	120	34
Stoughton D-2	4	....	1¼	1 3/16	45	2	¼	1	45	2	¼	1	126	34
Stoughton E–2½	4	....	1¼	1 3/16	52	2¼	¼	1	52	2¼	¼	1	136	36
Success B–2½	....	....	1 3/16	¼	55	2¼	¼	1	55	2¼	¼	1	132	32¼
Sullivan E–2–1916–20	3	¼	1 1/16	1 1/16	13	3½	¼	8	13	3½	¼	8	144	34
Sullivan F–1½—1917–20	3	1/8	1 1/16	1 1/16	13	3½	¼	8	13	3½	¼	8	106	33½
Superior D–1—1919–20	3	1/8	1 1/16	1 1/16	45	2½	1/8	2	44	2¼	1/8	2	97¾	34
Superior E–2—1919–20	3	1/8	1 1/16	1 1/16	54	2½	1/8	2	53½	2½	1/8	2	114	34
Texan TK39–¾	3	1/8	1	1¼	17½	2¼	1/8	4	17½	1½	1/8	4	100	36
Tiffin GW–1½—1919–20	3	1/8	1¼	1¼	46	2	¼	1	46	2	¼	1	114	35
Tiffin MW–2½—1919–20	3	1/8	1¼	1¼	52	2¼	¼	1	52	2¼	¼	1	138	32¾
Tiffin PW–3½—1919–20	3	1/8	1¼	1¼	58	2½	¼	1	58	2½	¼	1	151	35½
Tiffin TW–5—1919–20	3	1/8	1¼	1¼	58	3	¼	1	58	2½	¼	1	156	38½
Tiffin UW–6—1919–20	3	1/8	1¼	1¼	58	3	¼	1	58	2½	¼	1	156	38½
Titan 3½—1919	3	¼	1½	1¾	60	2¼	1/8	2	14	4½	1/8	2	144	34
Titan 5-6—1918–20	3	¼	1½	1¾	90	2¼	1/8	2	14	4½	1/8	2	144	34
Titan 2½—1920	3	¼	1¼	1¼	54	2½	1/8	2	26	4	1/8	1	144	32
Tower J–1½—1920	3	1/8	1¼	1¼	11¾	3¼	¼	4	11¾	3¼	¼	4	135½	32½
Tower H–2½—1919–20	3	1/8	1¼	1¼	13 1/16	3½	¼	4	13 1/16	3½	¼	4	139	32½
Tower G–3½—1919–20	3	¼	1½	1½	15 5/8	3¾	¼	4	15 5/8	3¾	¼	4	152 11/16	37
Traffic C-4000—1919–20	3	1/8	1	1/8	43½	2½	1/8	2	38	1¾	1/8	2	120¾	42
Transport 20–1	3	1/8	.....	.....	48 7/8	2	1/8	2	45 7/8	1½	1/8	2	101	34
Transport 30–1½	3	1/8	.....	.....	48 7/8	2½	1/8	2	45 7/8	1½	1/8	2	117	34
Transport 50–2½	3	1/8	.....	.....	50 5/8	3	1/8	2	48½	2½	1/8	2	123	34
Traylor B-1	....	....	1¼	1½	50	2	½	2	50	2	½	2	117	34
Traylor C–1½	....	....	1¼	1½	50	2	½	2	50	2	½	2	120	34
Traylor D–2½	....	....	1¼	1½	56½	2¼	½	2	56½	2¼	½	2	142	34
Triangle AA–1¼—1920	3	....	1	1	23 1/16	2½	1/8	1	41	2	1/8	1	94	35
Triangle A–1½—1918–20	3	....	1	1	10	4	1/8	2	49	2	1/8	1	126	34
Triangle B–2½—1919–20	3	....	1¼	1¼	10	4	1/8	2	52	3	1/8	1	132	34
Triangle C–2—1920	3	....	1	1	10	4	1/8	2	52	3	1/8	1	128 3/16	34
Triumph 1½	....	....	....	....	....	....	....	....	....	....	....	....	120	....
Twin City A–3½ & B–5	3	....	2	2	16	3½	¼	2	48	3½	¼	2	138	46

Name, Model, Tonnage and Year	ENGINE				BRAKE LINING								FRAME	
	Piston Rings		Carburetor		Service				Emergency				Length	Width
	No. per cyl.	Width	Outlet Diameter	Inlet Diameter	Length	Width	Thickness	No. of Pieces	Length	Width	Thickness	No. of Pieces	Back of Driver's Seat	Over All
Ultimate–1½	4	¼	1 1/16	1 3/16	45	2	¼	2	45	2	¼	2	120	32¾
Ultimate–2½	4	¼	1 1/16	1 3/16	51	2¼	¼	2	51	2¼	¼	2	131	32¾
Union F–2½	3	¼	1¼	1	55	3	1/8	1	50	2	1/8	1	144	32
Union H–4	3	¼	1¼	1	19	3½	1/8	2	10	4	1/8	1	168	34
United–1½	....	....	1	1 1/16	48	2	1/8	1	48	1½	1/8	1	120	33
United–2½	....	....	1¼	1 1/16	49	3	1/8	1	49	2½	1/8	1	Opt	33
United–3½	....	....	1¼	1 1/16	62	3	1/8	1	58	2½	1/8	1	Opt	34
United–5	....	....	1½	1 1/16	88½	2¼	1/8	1	88½	2¼	1/8	1	Opt	38
U.S.N.–1½	3	1/8	1	1/8	50½	2	1/8	2	46½	1½	1/8	2	120	34
U.S.R.–3	3	1/8	1¼	¼	46	2¼	¼	2	46	2¼	¼	2	144	34
U.S.S.–4	3	1/8	1½	¼	50	2½	¼	2	50	2½	¼	2	156	36
U.S.T.–5	3	¼	1½	¼	62	3	¼	2	62	3	¼	2	168	36
Velie 46–1½—1919–20	3	1/8	1	1/8	54 1/8	2½	1/8	4	52 1/16	2¼	1/8	2	120	31
Vim 29–½	3	1/8	.....	1/8	14½	1½	1/8	4	14½	1½	1/8	4	64	30
Vim 30–½	3	1/8	.....	1/8	14½	1½	1/8	4	14½	1½	1/8	4	83½	30
Vim 31–1	4	1/8	1	.....	19	2	1/8	4	19	2	1/8	4	92	32
Vim 22–2	4	1/8	1	.....	44½	2	¼	2	44½	2	¼	2	121¼	34
Vim 23–3	5	1/8	1¼	.....	51½	2¼	¼	2	51½	2¼	¼	2	159½	34
Walker M½	....	....	....	....	43	2¼	1/8	2	18	1¾	1/8	4	87	32
Walker K1	....	....	....	....	46	2½	1/8	2	18	2	1/8	4	96	32
Walker L2	....	....	....	....	53½	2½	1/8	2	22½	2	1/8	4	120	35
Walker P3½	....	....	....	....	53½	3	1/8	2	22½	2½	1/8	4	140	35
Walker N5	....	....	....	....	53½	3	1/8	2	22½	2½	1/8	4	162	35
W. J.–B2½	3	¼	1¼	1½	13	3½	¼	2	13	3½	¼	2	138	32
Walter 8–5	3	¼	1¾	....	15	5	¼	4	57	2½	¼	2	150	36
Ward LaFrance 2B–2½—1920	3	¼	.....	1¼	13 1/8	3½	¼	4	13 1/8	3½	¼	4	124	33
Ward LaFrance 4A 3½—1920	3	¼	.....	1½	15 5/8	3¾	¼	4	15 5/8	3¾	¼	4	169½	37
Ward LaFrance 5A–5—1920	3	¼	.....	1½	17 11/16	4	¼	4	17 11/16	4	¼	4	217½	37
Ward WS2	....	....	....	....	29	1½	1/8	2	29	1½	1/8	2	72	32 1/16
Ward WA	....	....	....	....	16	1¾	1/8	8	16	1¾	1/8	8	95	33 1/16
Ward WB	....	....	....	....	20	2	1/8	8	20	2	1/8	8	120	33¾
Ward WD	....	....	....	....	48 7/8	2¼	¼	4	48 1/16	2¼	¼	4	144	33 1/16
Ward WF	....	....	....	....	56 7/8	2½	¼	4	56 1/16	2½	¼	4	168	34 9/16
Ward WH	....	....	....	....	68¾	3	¼	4	68¾	3	¼	4	192	37
Wells 2	3	1/8	.....	¼	54	2½	1/8	2	51	2½	1/8	2	120¼	34
White 15–¾	3	....	.....	....	....	....	....	....	....	....	....	....	76½	34
White 20–2	3	....	.....	....	....	....	....	....	....	....	....	....	107½	34
White 40–3	....	....	1	....	....	....	....	....	....	....	....	....	157	42
White 45–5	....	....	1	....	....	....	....	....	....	....	....	....	157	42
White Hickory H–1½—1920	3	1/8	1¼	1	13½	3½	¼	4	13½	3½	¼	4	116¼	32
White Hickory E–1—1920	3	1/8	1	1	11	3	¼	4	11	3	¼	4	92¼	32½
White Hickory K–2½—1920	3	1/8	1½	1¼	13½	3½	¼	4	13½	3½	¼	4	150	32
Wichita K–1—1915–20	3	1/8	1	1 3/8	19½	2	1/8	4	19½	2	1/8	4	126½	30
Wichita L–1½—1916–20	3	¼	1	1 3/8	45	2	1/8	2	19	2	1/8	2	126½	30
Wichita M–2—1915–20	3	¼	1	1 3/8	45	2	¼	2	45	2	¼	2	126½	30
Wichita R–2½—1917–20	3	¼	1	1 3/8	51	2¼	¼	2	51	2¼	¼	2	126½	30
Wichita RX–2½—1919–20	4	¼	1¼	1¾	51	2¼	¼	2	51	2¼	¼	2	130	30
Wichita O–3½—1915–20	4	¼	1¼	1¾	56	2½	¼	2	56	2½	¼	2	152½	36
Wichita S–5—1919–20	4	¼	1½	2	60	3	¼	2	60	3	¼	2	163½	36
Wilcox A–1—1919	3	¼	.....	.....	24 1/16	2½	1/8	4	16	2½	1/8	4	96	34
Wilcox B–1½—1919	3	¼	.....	.....	24 1/16	2½	1/8	4	16	2½	1/8	4	132	33
Wilcox C–2½—1919	....	....	.....	.....	27½	2½	1/8	4	20	2½	1/8	4	141	33
Wilcox E–3½—1920	....	....	.....	.....	56½	2½	¼	2	56½	2½	¼	2	156	33
Wilcox W–5—1919	3	¼	.....	.....	68½	3	¼	2	68½	3	¼	2	153	38
Wilson 1½—1919–20	3	1/8	.....	1	39½	1¾	¼	2	39½	1¾	¼	2	120	33
Wilson 2½—1919–20	3	1/8	.....	1 1/16	13¼	3½	1/8	4	13¼	3½	1/8	4	126	33
Wilson 3½—1919–20	3	1/8	.....	1½	16	3¾	1/8	4	16	3¾	1/8	4	147	38
Wilson 5—1919–20	3	1/8	.....	1½	18	4	1/8	4	18	4	1/8	4	147	38¼
Winther 39–1½	3	¼	1¼	.....	50	2¼	¼	2	22½	2¼	¼	1	120	30
Winther 430–1½	3	¼	1¼	.....	50	2¼	¼	2	22½	2¼	¼	1	120	30
Winther 49–2	3	¼	1¼	.....	52	3	¼	2	50	2¼	¼	2	144	33
Winther 70–3½	3	¼	1¼	.....	62	3	¼	2	60	2½	¼	2	156	33
Winther 109–5	3	¼	1½	.....	93	2¼	¼	2	93	2¼	¼	2	156	33
Winther 140–7	3	¼	1½	.....	93	2¼	¼	2	93	2¼	¼	2	156	33
Witt Will N–1½—1919–20	3	1/8	1¼	1¼	46	3¼	¼	4	46	3¼	¼	4	102	32
Witt Will P–2—1919–20	3	1/8	1¼	1¼	48	3½	¼	4	48	3½	¼	4	122	32
Wolverine C–1½—1918–20	3	1/8	1	1	41½	2½	¼	2	41½	1¾	¼	2	120	34½
Wolverine D–2—1920	3	1/8	1	1	51	3	1/8	2	46	2	1/8	2	132	34½

KEY OF ABBREVIATIONS

Note: Numerals on This Page Correspond With Numerals at Head of Specification Columns on Pages Following

In all Specifications { O—Own / Op or Opt—Optional

Engine:
Beav—Beaver
Cont—Continental
GBS—Golden, Belknap & Swartz
Her—Hercules
Hin—Hinkley
HSp—Herschell-Spillman
1 LeR—Le Roi
Lib—Liberty
LMF—Light Mfg. & Fdy.
Lyco—Lycoming
Rut—Rutenber
Ster—Sterling
Vict—Victory
Wau—Waukesha
Wis—Wisconsin

Valve Arrangement:
H—Overhead
2 L—ELL-Head
T—TEE-Head
S—Sleeve

How Cooled:
A—Air
3 C—Centrifugal
G—Gear Pump
T—Thermo-Syphon

Radiator (Make):
BW—B & W
Brm—Brenem
Bus—Bush
Can—Candler
Chic—Chicago
EM—English-Mersick
Eur—Eureka
Fed—Fedders
Flex—Flexo
4 GO—G. & O.
Har—Harrison
Hoo—Hooven
Idl—Ideal
Jam—Jamestown
Kue—Kuenz
Liv—Livingston
Lng—Long
McC—McCord
May—Mayo
Per—Perfex
R-T—Rome-Turney
Spar—Spartan
Spec—Special
Spi—Spirex
Stan—Standard

Radiator (Type):
5 C—Cellular
H—Honeycomb
PT—Plain Tube
FIN—Fin Tube
ZZT—Zig-zag Tubular

Lubrication:
6 FS—Force and Splash
F—Force Feed
S—Splash

Carburetor:
B&B—Ball & Ball
Bent—Bennett
Cart—Carter
Eag—Eagle
Ens—Ensign
Flch—Fletcher
Holl—Holley
John—Johnson
7 King—Kingston
Mar—Marvel
Mas—Master
Mill—Miller
Rayf—Rayfield
Strm—Stromberg
Shk—Shakespeare
Sheb—Schebler
Stew—Stewart
Till—Tillotson
Zen—Zenith

Fuel Feed:
8 G—Gravity
P—Pressure
V—Vacuum

Governor:
Con—Continental
Del—Delaney
Dup—Duplex
Hin—Hinkley
9 Mer—Merrill
McC—McCanna
Mon—Monarch
Phar—Pharo
Pier—Pierce
Rug—Ruggles
Sim—Simplex
Wau—Waukesha

Clutch (Make):
BB—Borg & Beck
D—Detlaff
Fu—Fuller
10 DG—Detroit Gear & Mach.
H—Hartford
BL—Brown-Lipe
ME—Merchant & Evans
Mu—Muncie
Co—Covert
W—Warner

Clutch (Type):
D—Disc
11 C—Cone
DP—Dry Plate
WP—Wet Plate
WD—Wet Disc
DD—Dry Disc
Fr—Friction

Ignition System:
Aer—Aero
AtK—Atwater-Kent
AuL—Auto-Lite
Bos—Bosch
Ber—Berling
Con—Connecticut
Del—Delco
Dix—Dixie
12 Eis—Eisemann
Kin—Kingston
KW—K. W. Ignition Co.
Lor—Louraine
NE—North East
POL—Prest-O-Lite
Rem—Remy
Sim—Simms
Spl—Splitdorf
Wes—Westinghouse

Engine Starter:
AC—Allis-Chalmers
AL—Auto-Lite
Bj—Bijur
DL—Delco
13 Dy—Dyneto
GD—Gray & Davis
LN—Leece-Neville
NE—North East
RE—Remy
Wg—Wagner
USL—U. S. L.
W—Westinghouse

Gearset:
B-Li—Brown-Lipe
Cott—Cotta
Covt—Covert
D-Sea—Driggs-Seabury
14 Det—Detroit
Dun—Dundore
Durst—Durston
Full—Fuller
G-Le—Grant Lees
MM—Mechanics Mach. Co.
Munc—Muncie
Rock—Rockford
Warn—Warner

Location of Gearset:
15 A—Amidships
R—Rear
U—Unit with engine
J—Unit with jackshaft

Universal:
16 Acm—Acme
Arv—Arvac
Bear—Bearings Co.
Bld—Blood Brothers
Dit—Ditwiler
Flex—Flexite
Hart—Hartford
KB—Kinsler-Bennett
Mech—Mechanics
M&E—Merchant & Evans
Pet—Peters
Sned—Snead
Spic—Spicer
Ster—Sterling
Ther—Thermoid
UM—Universal Machine
UP—Universal Products

Springs:
Cham—Champion
Det—Detroit
GC—Garden City
Hig—Higgins
IC—Iron City
Kal—Kalamazoo
Lah—Laher
Mar—Maremont
Math—Mather
17 Mer—Merrill
Nat—National
Per—Perfection
Row—Rowland
Shel—Sheldon
SP—Spring Perch
Stan—Stan-Par
Ster—Sterling
Tem—Temme
Tut—Tuthill
US—United States
Wis—Wisconsin

Final Drive:
B—Bevel Gear
C—Chain
I—Internal Gear
18 N—Concentric Spur
P—Spur
R—Double Reduction
S—Spiral Bevel
W—Worm

Rear Axle (Make):
Badg—Badger
Cel—Celfor
Stan—Chicago
19 Cl—Clark
Emp—Empire
Hind—Hindley
Keno—Kenosha
Ken—Kennedy
Rock—Rockford
Russ—Russel
Sals—Salisbury
Sav—Savage
Shel—Sheldon
S-Par—Stan-Par
Thom—Thomson
Tim—Timken
Torb—Torbensen
W-M—Weston-Mott
US—United States
Walk—Walker
Wis—Wsconsin

Rear Axle (Type):
20 Flot—Floating
½-Fl—Semi-Floating
¾-Fl—¾-Floating
D—Dead

Steering Gear:
CAS—C. A. S. Products Co.
Gem—Gemmer
21 Jac—Jacox
Lav—Lavine
Ros—Ross
War—Warner
Woh—Wohlrab

Wheels:
Arc—Archibald
AuW—Auto Wheel
Bim—Bimel
Cla—Clark
Day—Dayton
Det—Detroit
E&O—Eberly & Oris
Hay—Haynes
Hoo—Hoopes Brothers
Jon—Jones
Kel—Kelsey
22 Mut—Mutual
Pru—Prudden
Roy—Royer
Rus—Russell
Sal—Salisbury
Sch—Schwartz
Smi—Smith
Sta—Stanwell
StM—St. Mary
Stn—Standard
Wan—Wayne
W&L—Waterhouse & Lester

Rim Equipment:
Bak—Baker
Det—Detroit
23 Fir—Firestone
Gdy—Goodyear
Jax—Jaxon
Kel—Kelsey
Stn—Stanweld

Commercial Car Specifications—Corrected Monthly

The Specifications, Chassis Prices, Etc., Are Corrected Each Month From Data Supplied Direct by the Makers. Gasoline Tractor-Trucks and Electric Commercial Cars Will be Found at the End of Gasoline Commercial Cars

See Also Replacement Table in "Service and Repair Departments." Truck Frame Dimensions Are Included in Replacement Table

(Where prices are not given it is because we have been unable to get them from authoritative sources)

Trade Name and Model	Chassis Price	ENGINE DETAILS: Make and Model Number 4 Cylinder unless otherwise noted	Bore and Stroke	N. A. C. C. Horsepower	Valve Arrange't	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	GEARSET: Make	Location	Speeds	Universal (Make)	Springs (Make)	REAR AXLE: Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Steering Gear (Make)	TIRES, WHEELS, RIMS: *Pneumatic †Dual Front	Rear	Wheels (Make)	Rim Equipment	Chassis Weight	Wheelbase	Pr. Cent of Weight on Rear Wheels
		1		2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20			21			22	23			
800 Pounds																																		
Pony	.....	Own	2¾x4	12.1	L	T	.....	H	FS	Strm	G	.....	.....	Fr	AtK	.....	Own	...	3	.....	Tut	C	Own	.....	4.2	12.25	Own	28x3	28x3	Pru	.....	800	92	60
1000 Pounds																																		
Champion	975	H-Sp	3½x5	19.6	L	T	.....	H	S	Zen	...	.....	BB	D	AtK	Dy	G-Le	...	3	.....	.....	B	Sals	Flot	.....	.....	.....	32x4*	32x4*	.....	.....	1900	118	....
Dodge	1085	Own	3⅞x4½	24.1	L	C	McC	PT	FS	Stew	V	.....	Own	DD	Own	NE	Own	U	3	.....	.....	S	Own	Flot	4.1	19.4	Own	33x4	33x4	Kel	Kel	1990	114	41
Duryea	600	Own	3½x3¾	18.2	...	A	.....	.....	S	King	...	.....	.....	.....	Bos	...	Own	...	2	.....	.....	O	Own	D	10	.....	Own	.....	.....	.....	.....	900	86	60
Ellsworth 25A	.....	Lyco	3¼x5	16.9	L	T	.....	PT	S	Cart	G	.....	BB	.....	Con	AL	G-Le	U	3	.....	Shel	B	.....	.....	4.7	16.	.....	30x3½*	30x3½*	Sal	Det	2100	108	70
Elmira	.....	LeR 2C	3½x4½	15.6	L	T	.....	H	FS	Holl	...	.....	.....	DD	Opt	.....	Own	...	3	Ther	Own	B	.....	½Fl	3.6	.....	Own	28x3½*	28x3½*	.....	.....	.....	104	65
Seneca	.....	LeR	3½x4½	15.6	L	T	Kue	C	S	Sheb	...	.....	D	D	Con	AC	.....	...	3	UM	Math	B	Peru	Flot	4.5	.....	.....	30x3½*	30x3½*	.....	.....	1700	108	80
Vim 29	1355	Own	3½x4½	15.6	L	T	McC	PT	FS	Zen	G	.....	BB	DD	Wes	W	.....	U	3	Spic	Shel	W	Shel	.....	5.5	.....	CAS	31x4*	31x4*	Hoo	Fir	2120	108	....
Vim 30	1550	Own	3½x4½	15.6	L	T	McC	PT	FS	Zen	G	.....	.....	DD	Wes	W	.....	U	3	Spic	Shel	W	Shel	.....	5.5	.....	CAS	32x4½*	32x4½*	Hoo	Fir	2250	127	....
1500 Pounds																																		
Atlas 21	.....	Lyco	3½x5	19.6	L	T	Own	H	S	Strm	...	.....	BB	DD	AtK	Wg	.....	...	3	Ster	Row	B	Own	.....	.....	.....	CAS	32x4½*	32x4½*	.....	.....	2320	130	60
Bethlehem K	1595	Own-K	3½x5	19.6	L	T	Liv	.....	F	Zen	G	.....	BB	DD	Bos	GD	Det	U	3	Spic	Math	S	S-Par	.....	5.9	18.9	Ross	34x4½	35x5	Wan	Fir	2660	125	65
G. M. C. 16	.....	Cont N-¾	3¾x5	22.5	L	C	McC	.....	S	Mar	G	Mon	Co	.....	Eis	.....	Own	U	3	Um	Det	B	Own	.....	6.	21.9	Jac	35x5*	35x5*	.....	Bak	2940	132	67
H. R. L.-L	2400	H-Sp 7000	3½x5	19.6	L	C	Fed	Fin	F	Zen	G	.....	Own	DP	Bos	GD	Covt	U	3	Spic	Shel	W	Wis	½Fl	6.2	22.	Ross	34x4½*	35x5*	Sch	.....	3300	134	....
International H	1750	Own-H	3½x5	19.6	L	C	Own	Fin	FS	Holl	G	Own	.....	DP	Bos	Own	Own	A	3	Own	.....	I	Own	D	7.	25.	Own	36x3	36x3½	Own	.....	2800	115	50
Kearns ¾	1550	L. M. F.-H	3¼x4½	16.9	...	T	Own	H	FS	Zen	...	Mon	BB	DD	Ber	Dy	G-Le	U	3	M-E	.....	I	Torb	D	.....	.....	Lav	32x4½*	32x4½*	.....	.....	2000	118	70
Marshall	.....	Lyco	3¼x5	16.9	...	T	.....	C	.....	.....	...	.....	H	.....	.....	.....	.....	U	3	.....	.....	.....	.....	Flot	.....	.....	.....	30x3½	30x3½	.....	Fir	.....	112	...
Oldsmobile	1500	Own-FB	3 11/16x5¼	21.7	H	C	Own	C	FS	Zen	V	.....	.....	C	AuL	AL	.....	U	3	Hart	.....	I	Torb	D	6.5	38. 87	Jac	35x5	35x5	AuW	Jax	2324	128	73
Rainier R11	1850	Cont-N	3½x5	19.6	L	C	Har	H	...	Zen	V	Mon	BL	DD	Sim	.....	B-Li	...	3	Hart	Per	W	Tim	.....	7.2	23.9	Lav	34x4½	34x4½	Sch	Fir	2350	125	80
Reo F	1385	Own	4½x4½	27.2	L	C	Own	PT	S	John	G	.....	Own	DD	Rm	.....	Own	A	3	Own	.....	B	Own	Flot	4.6	17.2	Own	34x4½*	34x4½*	Pru	Fir	2560	128	62. 5
Shaw M-2	1975	Cont N-¾	3¾x5	22.5	L	T	.....	PT	FS	Zen	G	.....	BL	.....	Bos	.....	B-Li	U	3	Spic	Math	B	Tim	.....	4.9	16. 31	Gem	32x4*	32x4*	Stn	Fir	2400	116	65
Stewart 11	1350	LeR-2C	3½x4½	15.6	L	T	Bus	PT	FS	Zen	G	.....	BB	DP	Eis	Dy	Durs	U	3	Hart	Det	I	Cl	D	6.6	18.06	CAS	32x4	32x4	Wan	Fir	2190	110	66. 7
Texan	1495	Lyco-K	3½x5	19.6	L	T	Har	C	FS	Cart	V	.....	BB	DD	Con	Bj	G-Le	U	3	UP	Mar	B	Peru	Flot	4.2	12.6	CAS	36x6*	38x7*	Stn	Fir	2500	112	60
Triangle AA	1650	H-Sp	3¼x5	16.9	L	T	Per	ZZT	S	Strm	G	.....	Fu	DD	NE	NE	Full	U	3	UP	Det	I	Cl	.....	6.1	18.1	Gem	35x5*	35x5*	Hay	Fir	2500	115	60
White 15	2400	Own	3¾x5½	22.5	L	C	.....	C	FS	Own	G	.....	Own	D	.....	.....	.....	A	4	Own	.....	B	Own	½Fl	.....	.....	Own	34x4½*	34x4½*	.....	Fir	2960	133	....
1 Ton																																		
Acason B	2400	Wau B.U.X.	3¾x5¼	22.5	L	P	Can	C	S	Sheb	V	Wau	Fu	.....	Eis	.....	Full	U	3	Bld	Det	W	Tim	.....	8.2	33.1	Ros	36x3½*	36x5	Bim	Opt	3650	142	....
Acme B	2175	Cont N	3¾x5	22.5	L	P T	GO	C	FS	Rayf	V	Dup	BB	D	Eis	GD	Cott	U	3	Bld	Det	W	Tim	.....	7.7	31.1	Ros	34x3½	34x5	Bim	.....	3750	130	50
All American 1	1795	H-Sp 7000	3½x5	19.6	L	T	Stan	C	F	Strm	G	Pier	BB	DP	Sim	Dy	Cott	...	3	Hart	Det	I	Torb	D	8.1	18.1	Lav	33x4*	32x4	Stn	Gdy	2600	130	75
Apex C	1745	Buda R.U	3¾x5 1/8	22.5	L	T	GO	.....	F	Strm	V	.....	Fu	.....	AuL	Op	Full	U	3	UP	Det	I	Torb	D	6.5	19.5	Lav	33x4*	32x3½	.....	Fir	2870	130	70
Beck Hawkeye A	1950	Cont N-¾	3¾x5	22.5	L	T	Har	C	S	Strm	G	Pier	Fu	DD	Bos	.....	Full	...	3	Bld	Hig	I	Cl	D	6.1	20. 51	Lav	35x5*	35x5*	Hay	Fir	2800	124	75
Belmont	.....	GBS-SMG	3¾x4¼	22.5	L	T	GO	.....	S	Zen	G	.....	BB	.....	Con	Dy	.....	U	3	Ster	.....	B	.....	¾Fl	5.2	15. 75	Lav	31x4*	31x4*	E-O	Stn	2000	113	60
Bessemer	.....	Cont N	3½x5	19.6	L	T	.....	C	FS	Strm	G	.....	Fu	DD	Bos	.....	Full	U	3	Arv	Per	I	Torb	D	7.1	20.25	Ros	34x3½	34x4	Sch	Fir	2910	124	57
Birch 1	1595	Vict	3½x5	19.6	...	T	Chic	.....	FS	Strm	...	.....	.....	DD	Con	.....	Full	U	3	UM	.....	I	Cl	D	.....	.....	Lav	32x3½	32x4	.....	.....	.....	132	....
Chevrolet T	1325	Own	3 11/16x5¼	21.7	H	C	T	Har	.....	FS	Zen	...	Mon	.....	C	Rm	AL	Warn	...	3	Arv	.....	W	.....	½Fl	.....	.....	War	33x4*	35x5*	.....	.....	.....	125	....
Clydesdale 32X	2375	Cont N	3¾x5	22.5	L	.....	PT	S	Zen	G	Own	BL	DD	Bos	.....	B-Li	U	3	Spic	Stan	W	S-Par	½Fl	7.5	24.1	Ros	34x3½	34x5	.....	.....	3500	144	72
Collier 18	.....	Cont N	3½x5	19.6	...	...	.....	PT	S	.....	...	Mon	Fu	D	.....	.....	Full	...	...	.....	.....	W	Own	.....	.....	.....	Ros	34x4	34x5	.....	.....	.....	140	....
Columbia F	1850	Cont N-¾	3¾x5	22.5	L	C	Lng	Fin	FS	Strm	G	Pier	BB	DD	Dix	.....	Covt	U	3	Spic	Per	I	Russ	D	7.5	21.1	Own	34x3½	34x5	StM	Fir	3000	125	70
Commerce E	1990	Cont N-¾	3¾x5	22.5	L	C	T	Lng	Fin	S	Zen	V	.....	DG	C	Eis	.....	Det	U	3	Spic	Det	I	Torb	D	7.1	22.9	Jac	35x5	35x5	Bim	Fir	2900	126	80
Conestoga 20	.....	Cont N	3½x5	19.6	L	T	EM	ZZT	S	Strm	G	.....	Fu	DD	Sim	.....	Full	U	3	Ster	Shel	W	Wis	.....	7.7	23.1	Ros	34x3½	34x5	E-O	Stn	3300	128	90
Corbitt E	2400	Cont N-¾	3¾x5	22.5	L	T	McC	PT	FS	Strm	V	Sim	Fu	DD	Eis	.....	B-Li	U	3	Hart	Shel	W	Shel	½Fl	6.5	19.5	Ros	34x3½	34x4	Bim	Fir	3890	130	75
Dart H	2100	Buda WU	3¾x5 1/8	22.5	L	T	T	Own	C	F	Zen	V	Pier	Co	DD	Eis	.....	Full	U	3	Spic	Per	W	Own	.....	7.5	22.5	Ros	34x3½	34x5	Pru	.....	3200	130	80
Day Elder A	2100	Cont N-¾	3¾x5	22.5	L	T	T	Bus	.....	FS	Zen	G	.....	Co	DP	Eis	.....	Covt	U	3	Hart	IC	W	Shel	½Fl	7.8	28.3	Gem	34x3½	34x4	Jon	Fir	3250	128	70
Denby 12	2150	Cont N-¾	3¾x5	22.5	L	T	T	Lng	PT	FS	Strm	G	.....	D	D	Eis	.....	Full	U	3	UP	Det	I	Russ	D	6.8	21.8	Ros	35x5	36x6	Hay	.....	3100	124	73
Diehl A	1750	Cont N	3½x5	19.6	...	T	.....	H	FS	Zen	G	.....	BB	.....	Sim	.....	Durs	...	3	KB	Mar	I	Torb	D	5.3	.....	Jac	34x4½*	35x5*	Sch	Fir	2400	115	90
Famous B-10	1995	Cont N	3½x5	19.6	L	T	C	Chic	PT	S	Strm	V	Mon	Fu	DD	Eis	.....	Full	U	3	Bear	Det	I	Cl	D	7.1	21.1	Ros	36x3½	36x4	Bim	Fir	3000	120	75
Federal SD	2600	Cont J-4	3¾x5	22.3	L	C	T	Own	.....	F	Zen	V	Phar	BB	DD	Eis	.....	Own	A	3	Pet	Math	W	Timk	.....	6.25	20.6	Gem	35x5*	36x6*	Det	Det	3600	132	65
Ford T	600	Own	3¾x4	22.5	L	C	T	Own	PT	S	Holl	G	.....	Own	WD	Own	Own	Own	U	3	Own	Own	W	Own	½Fl	7.2	20.1	Own	30x3½*	32x4½	Smi	.....	1000	124	....
Forschler A	2100	Cont N	3½x5	19.6	L	C	T	EM	.....	FS	Zen	...	Dup	Fu	.....	Bos	Op	Full	...	3	Hart	Own	W	Shel	.....	.....	.....	Ros	36x3	36x4	.....	.....	3450	120	....
Gary F	2100	Buda WU	3¾x5	22.5	...	C	T	.....	Fin	F	Mas	G	Pier	Fu	DD	Eis	.....	Full	U	3	Bld	Det	W	Timk	.....	7.2	21.6	Ros	36x3½	36x4	Pru	Gdy	3200	130	....
Giant 15	2425	Cont N	3¾x5	22.5	L	C	T	Idl	.....	FS	Sheb	G	.....	BL	DD	Eis	.....	B-Li	U	3	Spic	Math	W	Shel	.....	7.8	24. 97	Jac	34x3½	34x5	Wan	.....	2950	138	94
G. M. C. 16	.....	Cont N-¾	3¾x5	22.5	L	C	C	McC	.....	S	Mar	G	Mon	.....	.....	Eis	.....	Own	U	3	UM	Det	B	Own	.....	6.	21.9	.....	35x5*	35x5*	.....	.....	2940	132	67
Hahn J-4	.....	Cont J4-	3¾x5	22.5	L	C	T	Own	PT	F	Strm	G	.....	.....	DD	Eis	.....	B-Li	U	3	Spic	.....	W	Shel	.....	6.1	.....	.....	36x3½	36x5	.....	Bak	3200	.....	...
Higrade A18	2100	Cont N	3½x5	19.6	L	T	T	Per	PT	FS	Zen	V	Dup	Fu	DD	Sim	AL	Full	U	3	Bld	Per	W	Shel	.....	7.7	22.75	Lav	35x5	35x5	Dee	Fir	2700	113	66

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Trade Name and Model	Chassis Price	ENGINE DETAILS: Make and Model Number 4 Cylinder unless otherwise noted	Bore and Stroke	N. A. C. C. Horsepower	Valve Arrange't	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	GEARSET: Make	Location	Speeds	Universal (Make)	Springs (Make)	REAR AXLE: Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Steering Gear (Make)	TIRES, WHEELS, RIMS: *Pneumatic †Dual Front	Rear	Wheels (Make)	Rim Equipment	Chassis Weight	Wheelbase	Pr. Cent of Weight on Rear Wheels
		1		2	3	4	5	6	7	8	9		10	11	12	13	14	15	16	17	18	19	20			21	22		23				
1½ Ton—Con'd																																		
Harvey WEA	2550	Buda OU	4 1/8x5 1/2	27.2	L	G		PT	F	Zen	G	Mon	Fu	DD	Bos		Full	U	3	Arv	Shel	W	Shel		7.7	23.25	Ros	34x3½	34x5	StM		3850	128	80
Hawkeye K		Buda 2U	3¾x5 1/2	22.5	L	C		C	FS	Zen	G	Sim	Fu	DD	Eis		Full	U	3	Hart	Det	I	Cl	D	7.6	30.4	Ros	34x3½	34x5	Bim	Fir	3750	148	70
Higrade B20	2500	Cont K4	4 1/8x5¼	27.2	L	G	Per	PT	FS	Zen	V		Fu	DP	Eis	AL	Full	U	3	Bld	Per	W	Shel		7.7	31.	Lav	36x6	36x6	Det	Fir	3100	130	66
Hoover 20A		Cont N	3½x5	19.6	L	G	Can		F	Sheb	V	Pier	Fu		Dix		Full	U	3	Arv	Shel	W	Shel		7.8	23.4	Lav	36x4	34x5	E-O	Fir	3150	132	
H.R.L.-R	3250	Hink	4 x5¼	25.6	L	C	Fed	Fin	F	Zen	G	Hin	BL	DP	Bos	GD	B-Li	U	4	Spic	Shel	W	Shel	D	7.75	30	Ros	36x4	36x7	Sch		4560	144	
Huffman B	2075	Buda WU	3¾x5	22.5		T		C	F	Zen	G		Fu	DD	Dix		Full	U	3		Per	I	Torb	D	8.6		Lav	34x3½	36x6	Roy	Fir	3200	140	85
Huffman C	1875	Cont N	3¾x5 1/2	22.5		T		C	F	Zen	G		Fu	DD	Dix		Full	U	3		Per	W	Stan		12.2		Lav	34x3½	36x6	Roy	Fir	3350	140	85
Hurlburt	2850	Buda ITU	4 x5½	25.6	L	C	Own		FS	Flch	G	Dup	ME		Eis		B-Li		3		Per	W	Hind				Ros	34x4	34x5	Wan		4300	148	85
Independent E (Iowa)		Cont N 4	3¾x5	22.5	L	C	GC	PT	FS	Strm	V	Dup	Fu	DD	Bos		Full	U	3	Bld	GC	C	Russ	D	8.2		Lav	35x5*	38x7*	StM	Fir	3550	135	75
International K	2300	Own-K	3½x5¼	19.6	L	G	Own	Fin	FS	Holl	G	Own		DP	Bos	Own	Own	A	3	Own		I	Own	D	9	30	Own	36x3½	36x5	Own		3400	128	50
Jumbo 15	2850	Buda CTU	3¾x5¼	22.5	L	G	Own		F	Zen	G	Own	Fu		NE	NE	Full	U	3	Arv	Per	I	Cl	D	7.2		Jac	36x3½	36x5			3600	144	75
Kalamazoo G		Cont J4	3¾x5	22.5	L	P	GO	PT	F	Strm	V	Pier	Fu	D	Bos	Dy	Ful	A	4	Acm	Shel	W	Wis		8.2	41	Ros	34x4	36x5	Bim		5080	144	80
Kearns 1½	2100	H-Sp 7000	3½x5	19.6		T	Own	H	S	Zen		Pier	BB		Ber	Dy	G-Le	U	3	ME	Math	I	Torb	D	6.5		Lav	34x3½	34x6	Way		3400	136	70
Kelly-Springfield K31	3000	Own	3¾x5¼	22.5	L	C	Lng	Fin	F	Zen	G	Pier	Own	C	Eis	W	Covt	A	3	Own	Per	C	Own	D	8.6	31.58	Gem	36x3½	36x6	StM		4420	144	89
Kelly-Springfield K32	3000	Own	3¾x5¼	22.5	L	C	Lng	Fin	F	Zen	G	Pier		C	Eis	W	Covt	A	3	Spic	Per	W	Own	½Fl	8.6	31.58	Gem	36x3½	36x6	StM		4670	144	89
Kissel General Utility	2775	Own	3 1/8x5½	24.1	L	C	McC	Fin	S	Strm	V	Pier	W	C	Eis		War	U	3	Spic	Mat	W	Shel		7.8	28.5	Jac	36x3½	36x5	Pru		3890	152	69
Kleiber A		Cont C4	4 1/8x5¼	27.2			Per	C		Strm	G			WD	Bos		B-Li	A				W			7	33	Ros	36x3½	36x6	W-L			143	
Larrabee-Deyo U		Cont N¾	3¾x5	22.5	L	C	Bus	Fin	S	Sheb	G	Sim	BL	DD	Bos		B-Li	U	3		Mer	W	Shel	½Fl	7.6	25.5	Ros	34x3½	34x5	Hoo		3600	138	
Maccar L1½	2925	Cont C4	4 1/8x5¼	27.2	L	C	Own	Fin	FS	Strm	G	Pier	BL	DD	Eis		B-Li	U	3	Spic	Mer	W	Timk	½Fl	7	23.52	Ros	36x4	36x6	Sch		4300	150	70
Mack AB	3000	Own	4 x5	25.6	L	C	Own		S	Zen	G	Own	BL	DD	Spl		B-Li	U	4	Bld	Mer	C	Own	D	7	28.01	Own	36x4	36x3½*	Sch		4800	Op	68
Mack AB	3000	Own	4 x5	25.6	L	C	Own		S	Zen	G	Own	BL	DD	Spl		B-Li	U	4	Spic	Mer	W	Timk		8	34.09	Own	36x4	36x3½*	Sch		4900	Op	68
Master JW	2690	Buda OU	4 1/8x5½	27.2	L	C	Chic	PT	S	Mas	G	McC	Fu	DP	Eis		Full	U	3	Spic	Det	W	Timk	½Fl	7.7	23.25	Ros	34x3½	34x5	Pru		3800	142	78
Maxwell	1322	Own	3 1/8x4½	21.	L	C	Own	PT	FS	Eag	G		Own	C	AtK		Own	U	3	Own	Shel	W	Own	½Fl	7.25	34.4	Own	34x4½	34x4½	Kel	Fir	2385	124	50
Menominee H	2725	Wis EAU	4 x5	25.6	L	C		C	FS	Strm	G	Mon	Det	DP	Eis		Cott	U	3	Spic	Tut	W	Wis		8.3	30.65	Ros	36x3½	36x5	Stn	Fir		144	80
Moreland 20B		Cont C2	4 1/8x5¼	27.2	L	C	Own	C	FS	Mill	G			DD	Dix			A	4	Ther	US	W	Timk		7	33.88	Ros	36x3½	36x6	Smi		4150	126	
Napoleon 11	1860	Vict	3½x5	19.6	H	T		PT	F	Sheb	G		Fu	D	Con	AL	Full	U	3	Bld	Math	I	Torb	D	8	24	Lav	35x5*	36x6*		Fir	3450	133	65
Nelson-LeMoon F1½		Cont C4	4 1/8x5¼	27.2	L	C		Fin	S	Strm	G	Pier	BL	DD	Bos	W	B-Li	U	3	Own	Tut	W	Timk		7		Lav	36x3½	36x6	Pru	Gdy	3400		80
Noble B30		Buda CTU	3¾x5¼	22.5	L	C	Chic	Fin	F	Strm	G	Pier	Fu	DD	Eis	W	Full	U	3	W	Tut	W	Shel	½Fl	8.7	31.1	Lav	36x3½	36x5	Bim	Fir	4200	156	85
Norwalk	2025	Lyco K	3½x5	19.6	L	T	Stan	C	FS	Zen	V			BB		Del	Dy	G-Le		3	UM	SPar	W	Stan				CAS	343½	34x5			1850	143	75
O. K. 1½T	2450	Buda ITU	4 1/8x5½	27.2	L	G		PT	FS	Zen	V	Pier	Fu	DD	Eis		Full	U	3	Hart	Tut	W	Wis				Ros	36x3½	36x5				146	
Old Reliable A	2350	WisEU	4 x5	25.6	L	C	Chic	PT	FS	Strm	V	Mon	Fu	DD	Bos	Op	Full	U	3	Spic	Shel	W	Shel	½Fl	7.7	24.94	Ros	34x3½	36x6	StM		4150	138	90
Oneida B9	2915	Oneida	4 x5¼	25.6	L	C	Own	C	F	Strm		Own		DP			Own	A	3	Own	Math	W	Own	½Fl	8.2	33		36x3½	36x6			5025	144	
Orleans A	2700	Her CU2	4 x5½	25.6	L	C	Chic	PT	F	Opt	P		D	D	Opt		Cott		3	Bld	Mar	W	Wis		7		Ros	36x3½	36x5				144	80
Packard B-E	3200	Own	4 x5½	25.6	L	C			F	Own	P	Own		DP	Dix	Bj		A	4	Spic		W		Flot	6.2	28	Own	34x3½	34x3½*			4640	144	46.2
Paige 52-19	2980	HinHAA400	4 x5¼	25.6	L	C	Own		F	Strm	V	Hink	BL	DD	Bos	Op	B-Li	A	4	Spic	Per	W	Timk	Flot	7.7	37.51	Ros	34x3½	34x5	Own	Fir	4000	140	85
Rainier R6	2150	Cont N	3½x5	19.6	L	T	Har	H	FS	Zen	V	Mon		DP	Sim		B-Li	U	3	Hart	Per	W	Shel		7.8	25.97	Lav	34x3	34x5	Sch		3100	133	80
Reliance A10	2500	Buda ITU	4 x5½	25.6	L	C		PT	FS	Strm	G	Pier	Fu	DD	Eis		Full	U	3	Pet	Shel	P	Badg		6.6	19.08	Ros	36x3½	36x5	Bim	Gdy	4500	150	90
Republic 11X	2195	Cont N¾	3¾x5	22.5	L	T	Own	C	FS	Strm	G	Rug		DD	Bos		Full	U	3	Hart		I	Torb	D	8	23	Jac	34x4	34x6	Pru	Fir	3365	144	
Reynolds 3A	3250	Hin HAA	4 x5¼	25.6	L	C	Lng	Fin	F	Strm	G	Hink	Co	DD	Bos	W	Covt	A	4	Sned	Per	W	Shel		6.5	30.62	Lav	36x6*	38x7*	Smi			141	75
Rowe CW	2800	Wis CAU	3¾x5	22.5	L	C	Fed	H	F	Zen	G	Sim	B-L	DD	Bos		B-Li	U	4	Spic	Shel	W	Shel	½Fl	6.5	26	Ros	36x6*	36x6*	Hoo		3800	133	62
Royal 1½		Wis EAU	4 x5	25.6	L	C		H		Strm				D	Bos	Op	Own				Own	Mer	W	Timk				Ros	34x4	34x5				128	67
Sandow CG	2590	Cont N¾	3¾x5	22.5	L	T		Fin	FS	Strm	G			DD	Eis		Full	U	3	Spic	GC	W	Shel		7.8	23	Ros	34x3½	34x5	StM		3300	135	70
Schwartz BI	2385	Cont N¾	3¾x5	22.5	L	T	Fed	H	FS	Strm	G	Mon	BL	DD	Bos		B-Li	U	3	M-E	Row	I	Torb	D	8	26.9	Ros	34x3½*	34x5	Sch	Fir	3750	140	
Schwartz BW	2500	Buda CTU	3¾x5¼	22.5	L	T	Fed		F	Strm	G	Mon	ME	D	Bos		Dun	U	3	M-E	Row	W	Thom		8	26.9	Ros	36x6	34x5*	Sch	Fir	4000	140	
Selden 1½A	2460	Cont N	3¾x5	22.5	L	T	Lng		FS	Strm	G	Pier	BL	D	Eis		B-Li	U	3	Spic	Per	W	Timk		7	23.31	Lav	34x3½	34x5	Arc		3400	137	75
Service 31	2985	Buda IU	4 x5½	25.6	L	C		PT	F	Strm	G	Sim	BB	DP	Eis			A	4	Spic		W	Timk		7.7	37.5	Ros	36x3½	36x6	Bim		4850	150	65
Service 36	3415	Buda HU	4 1/4x5½	28.9	L	C		PT	F	Strm	G	Sim	BB	DP	Eis			A	4	Spic		W	Timk		7	33.8	Ros	35x5*	38x7*	Bim		4900	150	65
Signal H	2925	Cont C4	4 1/8x5¼	27.2	L	C	McC	Fin	FS	Strm	G	Pier	BL	DD	Eis		B-Li	A	4	Spic	Det	W	Timk	½Fl	7.75	31	Ros	34x4	36x6	Hay		4760	146	66
Southern 15		Buda RU	3½x5 1/8	19.6	L	T		PT	S	Zen			Fu	DD	Bos		Full		3		Mat	W	Shel				Ros	35x3½	35x5				144	70
Sterling 1½	3200	Ster FU	4x5¾	25.6	L	C	Own		F	Rayf	V	Wau	BL	DD	Eis		B-Li	U	4	Spic	Mat	W	Timk	½Fl	7.1	28	Ros	36x3½	36x5	Pru		4720	142	91
Stewart 9	2350	Cont N¾	3¾x5	22.5	L	C	Bus	PT	FS	Zen	G		Fu	DD	Eis		Full	U	3	Hart	Det	I	Cl	D	7.6	22.8	Gem	34x3½	34x5†	Wan	Fir	3440	140	70
Stoughton B		Wau BUX	3¾x5¼	22.5	L	C	Own	Fin		Strm	G			DD	Eis		B-Li	U	3	Ther		W	Shel		7.8	31.2	Lav	36x3½	36x5	Own	Gdy		140	
Sullivan F	2350	Buda M	3¾x4½	22.5	L	T		PT	F	Strm	G			C	Bos		Covt	A	3	Hart	Mer	W	Timk		8.5	31	Ros	36x3½	36x5	Wan		3500	129	60
Texan TK 39		Lyco K	3½x5	19.6	L	T		C	FS	Cart	V		BL	D	Con	Bj	G-Le	U	3	UP		W		½Fl	7.7	20.15	CAS	34x4	34x4	Bim	Fir	3200	130	60
Tiffin GW	2530	Cont C4	4 1/8x5¼	27.2	L	C		Fin	FS	Sheb	G	Pier	Fu	DP	Bos		Full	U	3	Hart	Kal	W	Shel		7.7	23.25	Ros	36x3½	36x5	Smi		3750	129	
Tower J1½		Cont C4	4 1/8x5¼	27.2	L	C		PT	S	Strm	G	Pier	Fu	DP	Eis		Full		3	Bld	Det	W	Timk	½Fl	7.25	29	Ros	35x5*	38x7*	Pru	Fir	4520	142	70
Transport 30	2250	Cont N	3¾x5	22.5	L	T	Spi	C	FS	Strm	G	Sim	Fu	DD	Eis		Full	U	3	Hart	Det	I	Cl	D	7.6	34	Jac	36x3½	36x5		Fir	3450	140	70
Traylor C	2875	Buda ITU	4 x5½	25.6	L	G	GO	Fin	F	Zen	G	Pier	Co	DD	Spl		Covt		3	Hart	Mer	W	Shel	½Fl	7.75		Ros	36x4	36x6	Sch		4700	138	78
Triangle A	2285	Wau BUX	3¾x5¼	22.5	L	C	Per	ZZT	S	Strm	G	Wau	Fu	DD	Eis		Full	U	3	UP	Det	I	Cl	½Fl	7.1	21	Gem	34x3½	34x6	Roy	Fir	3750	144	60
Triumph H	2450	Buda CTU	3¾x5¼	22.5	L	C		H	F	King	V	Pier	BB		Dix		Cott	U	3	UP			Rus				Lav	36x3½	36x6	Stn	Stn	4000	144	70
Ultimate A		Buda ITU	4 x5½	25.6	L	C	Bus		F	Strm		Pier	BL		Eis	W	B-Li		4	Spic	Shel	W	Shel		6.5		Ros	36x3½	36x4			4500	140	72
United A	2100	Buda CTU	3¾x5½	22.5	L	C	Stan	PT	F		G	Sim	Fu		Eis	Op	B-Li	U	3	Bld		I	Cl	D	7		Ros	34x3½	34x5	Pru	Fir		Op	80
U. S.-N	2350	Cont N	3¾x5	22.5	L	C	Lng	Fin	S	Strm	V		BL	DP	Eis	Op	B-Li	U	3	Opt	Shel	I	Cl	D	7.6	25.3	Lav	36x3½	36x5	Sch		3800	144	85
U. S.-N W	2775	Cont N	3¾x5	22.5	L	C	Lng	Fin	S	Strm	V		BL	DP	Eis	Op	B-Li	U	3	Opt	Shel	W	Shel		7.8	25.97	Lav	36x3½	36x5	Sch		3900	144	85
Velie 46	1925	Cont N¾	3¾x5	22.5	L	C	Own	PT	FS	Strm	G	Mon	BB	D	Ber		Durs	U	3	Pet	Mat	I	Torb	D	8	31.2	Ros	36x3½	36x5	Bim	Gdy	3650	133	80
White Hickory H		Cont N¾	3¾x5	22.5	L	C	Chic	Fin	FS	Strm	V	Sim	Fu	DD	Eis		Full	U	3	Pet	Shel	W	Timk		8.5	25.5	Ros	36x3½	36x5	Bim	Fir	3750	144	76
Wichita L	2600	Wau BX	3¾x5	22.5	L	P	Per	C	S	Strm	G	Wau	Own	C			Cott	A	4	Own	Det	W	Shel	½Fl	8.6	45.03	Ros	36x3½	36x5	Bim	Fir	3600	144	80
Wilcox B		Own	4½x5	32.4	L	P		Fin	S	Strm	G	Pier		C			Own	A	4	Own	Shel	W	Wis	½Fl	8.25	39.9	Own	36x4	36x5†			4600	135	75
Wilson F	2650	Cont J4	3¾x5*	22.5	L	C		Fin	FS	Mar	G	Pier	BB	DP	Eis		Own	A	4	Ther	Per	W	Timk		6	24	Ros	36x3½	36x5			3800	136	75
Winther 39	2450	Wis CAU	3¾x5	22.5	L	P		Fin	F	Strm	G		Fu	DP	Eis	W	Full	U	3	Arv	Hart	I	Cl	D	7	21	Lav	34x3½	34x5	Own	Fir	3700	140	70
Winther 430	2850	Wis CAU	3¾x5	22.5	L	P		Fin	F	Strm	G			DD	Eis	W	Full	U	3	Arv	Hart	I	Cl	D	9	36	Lav	32x4	32x4	Own	Fir	4100	132	70
Witt Will N	2150	Cont C4	3¾x5¼	22.5	H	G		C	FS	Zen	G	Pier		DD	Eis		Full	U	3	Spic		W	Timk		7	30.36	Ros	36x3½	36x4	Arc		3550	120	67
Wolverine C		Cont N	3¾x5	22.5	L	T	Lng	Fin	FS	Strm	G	Mon	Fu	DP	Eis	GD	Full	U	3	UP	Tut	I	Russ	D	8.2	32.8	Gem	34x3½	34x5	Hay	Gdy	3400	140	77
Wolverine D		Cont N	3¾x5	22.5	L	T	Lng	F	FS	Strm	G	Mon	Fu	DP	Eis	GD	Full	U	3	UP	Tut	I	Rus	D	10.2	46.8	Gem	34x4	34x7		Gdy	42.50	148	80

2 Ton

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Trade Name and Model	Chassis Price	ENGINE DETAILS: Make and Model Number 4 Cylinder unless otherwise noted	Bore and Stroke	N. A. C. C. Horsepower	Valve Arrange't	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	GEARSET: Make	Location	Speeds	Universal (Make)	Springs (Make)	REAR AXLE: Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Steering Gear (Make)	TIRES, WHEELS, RIMS: *Pneumatic †Dual Front	Rear	Wheels (Make)	Rim Equipment	Chassis Weight	Wheelbase	Pr. Cent of Weight on Rear Wheels
		1		2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20			21			22	23			
2 Ton—Con'd																																		
Triumph 2	2750	Buda	4¼x5½	28.9	L	C		H	S	King	V	Pier	BB		Dix		Cott	U	3	UP		I	Russ	D		8	Lav	36x4	36x3½†	Stn	Stn	4900	144	70
Twin City 2		Buda ITU	4x5½	25.6	L	C	Spi	H	F	Strm	V	Sim	Fu	WD	Bos		Full	U	3	Arv	Math	I	Cl	D	8	32	Ros	36x6*	40x8*	Bim	Fir	4800	150	80
Vim 22	3150	Her CU2	3¾x5½	22.5	L	G	McC	PT	F	Zen	G	Dup	BL	C	Dix		B-Li	U	4	Spic	Shel	W	Shel		7.7		Gem	36x4	36x6	Smi		4700	142	
Wells C1	2800	Wei	4⅛x5¼	27.2	L	G			FS	Strm		Mon		D	Ber	Dy	Cott	U	4	Acm		I		D	7	40	Lav	36x4	36x8	Smi	Stn	4400	168	82
White 20	3300	Own	3¾x5⅛	22.5	L	C		C	FS	Own	G		Own	D				A	4	Own		R	Own	½Fl			Own	36x4	36x7		Fir	4150	157	
Wichita M	2800	Wau BX	3¾x5¼	22.5	L	P	Per	C	F	Strm	G	Wau	Own	C			Cott	A	4	Own	Det	W	Shel	½Fl	10	55.45	Ros	36x3½	36x6	Bim	Fir	4700	144	80
Winther 49	3250	Wis EAU	4 x5	25.6	L	P	Brm	Fin	F	Mas	V		BB	DP	Eis	W	B-Li	A	4	Bld	Math	I	Cl	D	9	39	Ros	34x4	34x4	Own		5300	150	80
Witt Will P	3150	Cont C4	4⅛x5¼	27.2	H	G		C	FS	Zen	G	Pier		DD	Eis			U	3	Spic		W	Tim		7.75		Ros	36x3½	36x7	Arc		4550	144	70
2½ Ton																																		
Ace 2½	3450	Buda HU	4¼x5½	28.9	L	C		Spi		F	Sheb	G	Pier	BL		AtK	W	Cott	A	4	Spic	Math	W	Opt		7.7	34	Ros	36x6*	40x8*	Day	Gdy	5630	156	80
All American 2½	2395	HSp 7000	3½x5	19.6	L	T		C	F	Strm			D	DP	Sim		Cott		4	Hart	Per	I		D			Lav	34x4	34x6			Opt	Op	
American	3575	Wis	4 x6	25.6	L	C	GO	PT	F	Strm	G	Pier	D	D	Eis		Covt	A	3	Acm		W	Wis		8.6		Lav	36x4	36x4	Smi		5000	158	
Apex E	2695	Buda HTU	4¼x5½	28.9	L	C	GO		F	Strm	V	Dup	Fu		Eis	Op	Full	U	4	UP	Det	I	Torb	D	9	27	Lav	36x4	36x6		Fir	4500	160	70
Armleder HW		Buda HTU	4¼x5½	28.9	L	C	Bru	PT	F	Zen	G		Fu	DD	Bos		Full	U	4	Spic	Math	W	Timk		9	43	Ros	36x4	36x7	StM		4650	166	80
Atco A		Bud HU	4¼x5½	28.9	L	C		PT	F	Strm	G	Pier	Fu	D	Eis		Full		4	Hart	Shel	W	Wis		8.7		Ros	36x4	36x7			4900	150	
Atterbury 7CX LWB	3675	Cont C4	4⅛x5¼	27.2	L	C	Own	Fin	S	Zen	G	Mon	BL	DD	Ber		B-Li	U	4	Spic	SP	W	Timk	Flot	9.25	37	Gem	36x4	36x4	Arc	Fir	5280	171	92.5
Atterbury 7CX STD	3575	Cont C4	4⅛x5¼	27.2	L	C	Own	Fin	S	Zen	G	Mon	BL	DD	Ber		B-Li	U	4	Spic	SP	W	Timk	Flot	9.25	37	Gem	36x4	36x4†	Arc	Fir	5120	153	92.5
Available 2½	3475	Own	4⅛x5¼	27.2	L	C	Chic	Fin	FS	Strm	V	Pier	BL	DD	Bos		B-Li	A	4	Spic		W	Timk	Flot	8.66	34.66	Ros	36x4	36x8	Sch		4750	152	90
Bell O	2750	Buda HU	4¼x5½	28.9	L	C	Chic		F	Strm	V	Sim	BB		Eis		Det	U	3	UP	Det	Opt	Opt		8	38.4	Gem	34x5	34x7	Bim	Fir	4200	146	65
Bessemer J2		Cont C4	4⅛x5¼	27.2	L	C		C	FS	Strm	G	Pier	BB	DP	Bos		B-Li	A	4	Arv	Per	I	Torb	D	8	32	Ros	36x4	36x4†	Sch	Fir	4600	158	67
Bethlehem EH	2695	Own EH	4 x5¼	25.6	L	T	Fed	C	F	Strm	G	Pier	BB	DD	Bos	GD	Det	U	3	UP	Shel	I	Russ	D	10	32.64	Lav	34x4	34x6	Wan	Fir	4000	144	85
Bets D2		Buda HTU	4¼x5½	28.9	L	C			F	Strm		Pier	BL		Bos		B-Li		4	UM	Tut	W	Timk	Flot			Ros	36x4	36x7			4750	150	75
Brinton F	3400	Cont C4	4⅛x5¼	27.2	L	C	Bus	PT	F	Strm	G	Pier	BL	D	Bos		B-Li	U	3	Spic	Tut	W	Timk	Flot		33.6	Ros	36x4	36x6	Sch		4600	150	
Brockway K4	3200	Cont C4	4⅛x5¼	27.2	L	C	Bus	PT	FS	Strm	G	Opt	BL	DD	Eis		B-Li	A	4	Spic	Mer	W	Timk		8.5	34.	Gem	36x4	36x7	Hoo		4700	152	80
Capitol H 2½	3450	W isUAU	4¼x6	28.9	L	P	GO	PT	F	Strm	G	Sim	D	DD	Bos		Cott	U	4	Ther	Sp	W	Wis	½Fl	8.66	45	Ros	36x4	36x8	Det		5100	156	85
Capitol K2½	3850	Wis UAU	4¼x6	28.9	L	P	GO	PT	F	Strm	G	Sim	D	DD	Bos	W	Cott	U	4	Ther	SP	W	Wis	½Fl	7	36.4	Ros	36x6*	42x9*	Det	Fir	5200	156	85
Chicago C2½	3250	Her CU3	4 x5⅛	25.6	L				F	Strm	G	Sim	BL	DD	Bos		B-Li	U	4	Pet	Math	W	Timk	Flot	8.5	34	Gem	36x4	36x7	Opt	Stn	4500	156	
Clydsdale 65X	3540	Cont C4	4⅛x5¼	57.2	L	C		PT	S	Zen	G	Own	BL	DD	Bos		B-Li	A	4	Spic	Stan	W	Timk	Flot	8.5	34	Ross	36x4	36x8	Smi		5100	163	73
Columbia G	2850	Hink HAA	4 x5¼	25.6	L	C		Fin	F	Strm	V	Hink	Det	DP	Bos	W	Cott	A	4	Spic	Per	I	Russ	D	9.5	48.8	Own	36x4	36x7	Det	Fir	4250	148	80
Concord B	3400	Buda HTU	4¼x5½	28.9	L	C		P	S	Zen	G	Mon	BL	DP	Eis		B-Li	U	4	Spic	Per	W	Timk		8.5	34	Ros	36x4	36x4†	Arc	Fir	4600	150	70
Corbitt B	3650	Cont C4	4⅛x5¼	27.2	L	C	McC	P	FS	Strm	V	Sim	BL	DD	Eis		B-Li	U	4	Hart	Shel	W	Shel	½Fl	8.7	35	Ros	36x4	36x7	Bim	Fir	5325	152	75
Dart M	3000	Buda HU	4¼x5½	28.9	L	C	Own	C	F	Zen	G	Pier	Fu	DD	Eis		Full	U	4	Spic	Per	W	Own		8.5	40.8	Ros	36x4	36x7	Pru		4800	150	80
Day Elder C	2950	Buda TU	4¼x5½	28.9	L	P	Bus	PT	FS	Zen	G	Mon	Co	DP	Eis		Covt	U	3	Hart	IC	W	Shel	½Fl	10.3	37.9	Gem	36x4	36x7	Jon	Fir	5000	150	70
DeKalb E2½	2600	Cont C4	4⅛x5¼	27.2	L	C		PT	F	Mas	G	Co	Fu	DD	Eis		Full	U	3	KB	Math	W		Flot	9.3	33	Ros	36x5	36x6	Hay		4800	144	79
Dependable E	2950	Buda HTU	4¼x5½	28.9	L	C	Lng	Fin	F	Zen	V	Pier	Fu	DD	Dix	W	Full	A	4	Acm	Per	W	Wis	½Fl	8.6		Ros	36x4	36x7	Bim	Fir	5600	157	70
Doane 1919		Wau R	4¼x5¾	28.9				C	S	Mas		Wau		DD	Bos								C	D	7.7		Lav	36x5	36x7			5000	147	79
Erie 2½		Buda HTU	4¼x5½	28.9	L	C	MeC		FS	Strm	G	Pier	Fu	D	Bos		Full	A	4	Spic	Per	W	Shel				Ros	34x4	36x6	Hoo	Fir	5400	150	80
Fageol 3400	3900	Wau RUR4	4¼x5¾	28.9	L	C	Spi	C	S	Zen	G	Wau	BL	DD	Dix		Own	A	5	Spic	Math	W	Timk	Flot	5.6	59.5	Ros	34x4	36x7	Pru		4600	144	80
Gary J	3150	Buda HTU	4¼x5½	28.9	L	C		Fin	F	Mas	G	McC	BL	DD	Eis		Full	U	4	Spic	Det	W	Timk		8.5	41	Ros	36x4	36x7	Pru	Gdy	4850	148	
Gersix K	3500	Buda HTU	4¼x5½	28.9	L	C	Idl	C	F	Strm	V	Mon	BB		Bos		Cott	U	3	Bld	Tut	W	Own		9.6	39	Ros	36x4	36x7	Jon		5200	150	75
Gramm-Bernstein 25	3875	Hink	4¼x5½	28.9	L	C	Own	Fin	F	Strm	V	Hink	Own	DD	Eis		Own	A	4	Own	Per	W	S-Par	½Fl	7.7	36.7	Ros	36x4	36x4†	Smi	Fir	6800	150	91.3
Hahn EE		Cont E4	4½	32.4	L	C	Own	Fin	F	Strm	G	Pier		DD	Bos		B-Li		3	Spic		W	Timk		7.7		Ros	36x4	36x8			4800	145	65
Harvey WFA	3300	Buda HU	4¼x5½	28.9	L	C		ZZT	FS	Zen	G	Mon	BB	DP	Eis		B-Li	A	4	Spic	Shel	W	Shel		7.7	31	Ros	36x4	36x7	Sch		5300	150	80
Hendrickson I	3300	Buda HU	4¼x5½	28.9	L	C			F	Strm	G	McC		D	Dix		Full	A	4	Ther	Tut	W	Timk		7.7	37.2	Ros	36x4	36x7	Stn			Op	80
Hewitt Ludlow		Buda HU	4¼x5½	28.9					F	Strm							Cott	A	4	Spic		W	Wis				Ros	36x4	36x7			4800	150	
H. R. L., H	3650	Hink HAA	4 x5¼	25.6	L	C	Fed	Fin	F	Zen	G	Hink	BL	DP	Bos	GD	B-Li	U	4	Spic	Shel	W	Shel		8.75	30.	Ros	36x4	36x4†	Sch		5310	154	
Hurlburt 2½	3750	Buda HU	4¼x5½	28.9	L	G	Own		F	Flch	G	Dup	ME		Eis		B-Li		3		Per	W	Hind				Ros	36x4	36x4	Wau		5600	170	85
Independent H, (Ohio)		Cont K4	4⅛x5¼	27.2	L	G	Lng	PT	F	Sheb	G	Pier	Fu		Eis		Full	U	3	Spic	Math	W	Wis		9.6	39	Ros	36x4	36x8			4600	148	85
Indiana 25	3350	Own 38	4⅛x5¼	27.2	L	G	MeC	Fin	F	Strm	G	Pier	BB	DD	Eis			A	4	Acm	Shel	W	Shel	½Fl	7.75	39.5	Woh	36x4	36x8	Bim		5850	156	73
Jumbo 25	3450	Buda HU	4¼x5½	28.9	L	G	Own		F	Zen	G	Dup	Fu		Eis	Op	Full	U	4	Arv	Det	I	Cl	D	9		Jac	36x4	36x7	Day		4800	152	75
Kalamazoo H		Wis TAU	4x6	25.6	L	P	GO	PT	F	Strm	V	Pier	Fu	D	Bos	Dy	Full	A	4	Acm	Shel	W	Shel		8.75	42.8	Ros	36x4	36x8	Smi		6200	160	80
Kankakee 2½	3500	Cont 6 9N	3½x5¼	29.4	L	C		H	FS	Zen	V		War	DD	Del	DL	Warn		3	Acm	Tem	I	Russ	D	7.4	22.2	Ros	34x6*	40x8*	Bim	Gdy	4200	170	70
Karavan		Buda X TU	4¼x6	28.9	L	C	Fed		F	Zen	G	Dup	BL	DD	Ber		B-Li	A	4	Spic	Shel	W	Shel		7.75	37.51	Ros	36x4	36x8	Smi		5700	148	80
Kelly Springfield K35	3500	Own	3¾x5¼	22.5	L	C	Lng	Fin	FS	Zen	G	Pier	Own	C	Eis	W	Covt	A	3	Own	Per	C	Own	D	10	35.11	Gem	36x4	36x4	StM		5000	144	89
Kelly Springfield K36	3500	Own	3¾x5¼	22.5	L	C	Lng	Fin	F	Zen	G	Pier	Own	C	Eis	W	Covt	A	3	Spic	Per	W	Shel	½Fl	10	34.02	Gem	36x4	36x4†	StM		5145	144	89
Kimball C	3975	Wis UAU	4¼x6	28.9	L	C	Flex	PT	F	Zen	V	Dup	BL	DP	Ber	W	B-Li	A	4	Spic	US	W	Shel	½Fl	7.7	37.31	Ros	36x4	36x7	Smi	Fir	5100	Op	66
Kleiber B	3800	Cont E4	4½x5½	32.4			RT	Fin		Strm	G			WD	Bos		B-Li	A				W				37.5	Ros	36x5	36x8	WL			160	
Koehler M	3365	Her CU3	4 x5½	25.6	L	C	Own		F	Zen	G	Sim	BL	D	Eis		B-Li	A	4	Spic	Math	W	Timk		9.25	37	Lav	36x4	36x7	Wan		5050	162	75
Larrabee-Deyo K		Cont C4	4⅛x5¼	27.2	L	C	Bus	Fin	S	Sheb	G	Sim	BL	DD	Bos		B-Li	A	4	Opt	Mer	W	Shel	½Fl	8.7	35	Ros	36x4	36x7	Hoo		5700	176	
L.M.C. 2-20	2950	Cont C2	4⅛x5¼	27.2	L	C		Fin	S	Strm	P	Pier	BB		Bos	Wg	B-Li	A	4	Mech	Math	I	Russ	D	8.8	38.72	Lav	36x4	36x4†	Bim		4500	164	80
Maccar H 2½	3750	Cont E4	4⅛x5½	32.4	L	C	Own	Fin	FS	Strm	G	Pier	BL	DD	Eis		B-Li	U	3	Spic	Mer	W	Timk	Flot	7.75	31.08	Ros	36x4	36. 4†	Sch	Fir	5250	162	70
Master D	3540	Buda HU	4¼x5½	28.9	L	C	Chic	PT	FS	Mas	G	McC	Fu	DP	Eis		B-Li	U	4	Spic	Det	I	Torb	D	8	32	Ros	34x4	36x7	Pru		4300	144	76
Master DL	3640	Buda HU	4¼x5½	28.9	L	C	Chic	PT	FS	Mas	G	McC	Fu	DP	Eis		B-Li	U	4	Spic	Det	I	Torb	D	8	32	Ros	34x4	36x7	Pru		4400	170	76
Master W	3290	Buda HU	4¼x5½	28.9	L	C	Chic	PT	FS	Mas	G	McC	Fu	DP	Eis		B-Li	U	4	Spic	Det	W	Timk	Flot	8.5	34	Ros	34x4	36x7	Pru		4500	144	76
Master WL	3390	Buda HU	4¼x5½	28.9	L	C	Chic	PT	FS	Mas	G	McC	Fu	DP	Eis		B-Li	U	4	Spic	Det	W	Timk	Flot	8.5	34	Ros	34x4	36x7	Pru		4600	170	80
Moreland 20C	3775	Cont E4	4½x5½	32.4	L	C	Own	C	FS	Mill	G			DD	Dix			A	4	Ther	US	W	Timk		6.8	32.9	Ros	36x4	36x7	Smi		5380	144	
Netco H	3800	Cont E4	4½x5½	32.4	L	C	RT	PT	S	Zen	G		BL	DP	Eis		B-Li	A	4	Hart	Per	W	Timk	Flot	7.7	39	Ros	36x4	36x8	Arc	Gdy	6500	168	75
Noble D50		Buda HTU	4¼x5½	28.9	L	C	Chic	Fin	F	Strm	G	Pier	Fu	DP	Eis	W	Full	A	4	M-E	Tut	W	Shel	½Fl	8.7	42	Lav	36x4	36x8	Bim	Fir	5000	176	85
Ogden C2	2995	Cont C4	4⅛x5¼	27.2	L	C			FS	Rayf	G	Pier	BB		Bos		B-Li	U	4	Acm	Tut	W	Timk		8.5		Gem	36x4	36x7	Stn		5600	160	70
O. K. 2½ T	3250	Buda HTJ	4¼x5½	28.9	L	C	RT	P	FS	Zen	V	Pier	Fu	DD	Eis		Full	A	4	Hart	Tut	W	Wis				Ros	36x4	36x7				150	
Old Reliable B	3500	Wis UU	4¼x6	28.9	L	C	Chic	PT	FS	Strm	V	Mon	Fu	DD	Bos		Full	A	4	Spic	Shel	W	Shel	½Fl	7.7	37.2	Ros	34x4	36x4†	StM		5750	166	70
Oneida C9	3390	Oneida	4 x5¼	25.6	L	C	Own	C		Strm		Own		DP			Own	A	4	Own	Math	W	Own	½Fl	8.6	41x5		36x4	36x7			5495	160	80
Orleans B	3150	Her CU3	4¼x5½	28.9	L	C	Chic		F	Opt		Dup	D	D	Opt		Cott		4	Bld	Mar	W	Wis		8		Ros	36x4	36x7					

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Trade Name and Model	Chassis Price	ENGINE DETAILS: Make and Model Number 4 Cylinder unless otherwise noted	Bore and Stroke	N. A. C. C. Horsepower	Valve Arrange't	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	GEARSET: Make	Location	Speeds	Universal (Make)	Springs (Make)	REAR AXLE: Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Steering Gear (Make)	TIRES, WHEELS, RIMS: *Pneumatic †Dual Front	Rear	Wheels (Make)	Rim Equipment	Chassis Weight	Wheelbase	Pr. Cent of Weight on Rear Wheels
		1			2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20			21			22	23			
3½ Ton—Con'd																																		
Gramm-Bernstein 35	4775	Hink	4½x5½	32.4	L	C	Own	Fin	F	Strm	V	Hink	Own	DD	Eis		Own	A	4	Own		W	Stan		8.7	50.6	Ros	36x5	40x5†	Smi	Fir	8640	156	91.7
Hahn F		Cont E4	4½x5½	32.4	L	C	Own	PT	F	Strm		Pier		DD	Bos		B-Li	A	4	Spic		W	Timk		10		Ros	36x5	36x5†			6600	Op	65
Hall 3½	4100	Cont E4	4½x5½	32.4	L	T	Own	PT	FS	Zen	G	Dup	BL	DP	Bos		B-Li	A		Opt	Det	W	Timk		10		Gem	36x5	36x5†	Smi		6825	Op	
Harvey WHA	4300	Buda YU	4½x6	32.4	L	G		Fin	FS	Zen	G	Mon	BB		Eis		B-Li	A	4	Spic	Shel	W	Shel		8.7	42.35	Ros	36x5	36x5†	Smi		7700	160	80
Hendrickson J	4200	Buda HTU	4¼x5½	28.9	L	C			F	Strm	G	McC		D	Dix		Full	A	4	Ther	Tut	W	Timk		10	49.6	Ros	36x5	36x5	Stn			Op	80
Hewitt-Ludlow		Buda	4½x5½	32.4						Strm			BB		Bos		Cott		4	Spic		W	Wis				Ros	36x5	36x5			6300	156	
Hurlburt	4400	Buda YU	4½x6	32.4	L	C			FS	Flch	G	Dup		D	Eis		B-Li	A	4	Spic		W		Flot	8.7	41.91	Ros	36x5	36x5	Wan		6400	156	
Indiana 35	4150	Own 40	4⅜x5½	30.6	L	C	McC	Fin	F	Strm	G	Pier	BB	DD	Eis			A	4	Spic	Shel	W	Shel	½Fl	10.2	49.6	Woh	36x5	36x5†	Smi		7050	160	75
International L	4500	Own L	4¼x5	28.9	H	T	Own	Fin	FS	Ens	G	Own	Own	DP	Dix	Own	Own	A	4	Own		I	Own	D	11	53.25	Own	36x5	40x10	Own		7500	160	50
Jackson B	4250	Cont E4	4½x5½	32x4	L	C		Fin	FS	Strm		Pier	BB	DP	Eis	GD			4	Spic	Per	B	Own	Flot	9.2	43.49	Ros	36x7	36x7			7000	150	65
Jumbo 35	4550	Buda YU	4½x6	32.4	L	G	Own		F	Zen	G	Sim	BL		Eis	Opt	B-Li	U	4	Spic	Per	I	Cl	D	9		Jac	36x5	36x10	Day		8000	160	80
Kalamazoo K		Wis UAU	4¼x6	28.9	L	P	GO	PT	F	Strm	V	Pier	Fu	D	Bos	Dy	Full	A	4	Acm	Shel	W	Shel		10.25	49.8	Ros	36x5	36x5†	Smi		6400	165	75
Kelly-Springfield K40	4400	Own	4½x6½	32.4	T	C	Lng	Fin	F	Zen	G	Pier	Own	C	Eis	W	Covt	A	3	Own	Per	C	Own	D	10	31.6	Gem	36x5	40x5†	StM		7730	150	93
Kissel Heavy Duty	4475	Own 14000	4¼x5½	28.9	L	C	McC		S	Strm	V	Pier			Eis		War	A	4	Spic	Shel	W	Shel		11.7	58.6	Ros	36x5	36x5†	Smi		6840	168	74
Kleiber C	4400	Cont E4	4½x5½	32.4			RT			Strm	G			WD	Bos		B-Li	A				W			8.7	42.35	Ros	36x5	36x10	W-L			163	
Larrabee-Deyo L		Cont E4	4½x5½	32.4	L	C	Bus	Fin	S	Sheb	G	Sim	BL	DD	Bos		B-Li	A	4	Opt	Mer	W	Shel	½Fl	10	41	Ros	36x5	36x5†	Hoo		6850	186	
Maccar M2	4500	Wis VAU	4½x6	32.4	L	C	Own	Fin	FS	Strm	G	Pier	BL	DD	Eis		B-Li	U	4	Spic	Mer	W	Timk	Flot	8.75	35.09	Ros	36x5	36x5†	Day	Fir	6175	172	70
Mack AC	4950	Own AC	5 x6	40	L	C	Own	PT	S	Zen	G	Own	Own	DP	Aer		Own	UJ	3	Spic	Mer	C	Own	D	8	27	Own	36x5	40x5†	Sch		8070	Op	65
Master A	4190	Buda YTU	4½x6	32.4	L	C	Chic	PT	FS	Mas	G	Pier	BL	DP	Eis		B-Li	A	4	Spic	Det	W	Timk	Flot	10	41.32	Ros	36x5	40x5†	Smi		7000	158	72
Master AL	4290	Buda YTU	4½x6	32.4	L	C	Chic	PT	FS	Mas	G	Pier	BL	DP	Eis		B-Li	A	4	Spic	Det	W	Timk	Flot	10	41.32	Ros	36x5	40x5†	Smi		7200	194	72
Master E	4030	Buda YTU	4½x6	32.4	L	C	Chic	PT	FS	Mas	G	Pier	BL	DP	Eis		B-Li	U	4	Spic	Det	I	Walk		11.5		Ros	36x5	40x5T	Smi		7200	158	72
Master EL	4740	Buda YTU	4½x6	32.4	L	C	Chic	PT	FS	Mas	G	Pier	BL	D	Eis		B-Li	A	4	Spic	Det	I	Walk		11.5		Ros	36x5	40x5†	Smi		7200	194	72
Menominee G	4270	Wis VAU	4½x6	32.4	L	C		Fin	FS	Strm	G	Pier	D	DP	Eis		Cott	A	4	Spic	Tut	W	Wis		10	41.32	Ros	36x5	36x5†	Stn	Fir		160	80
Nelson & LeMoon 3½		Cont E4	4¼x6½	28.9	T	C		Fin	S	Strm	G	Mon	BL		Bos		B-Li	U	4	Own	Tut	W	Timk		8.7	42	Lav	36x5	36x5†	Pru	Gdy	6000	Op	80
Noble E70		Buda YTU	4½x6	32.4	L	C	Chi	Fin	F	Strm	G	Pier	Fu	DP	Eis	W	War	A	4	M-E	Tut	W	Shel	½Fl	8.7	42	Lav	36x5	36x10	Bim	Fir	6500	182	85
Northway B3		Own	4 x6	25.6	H	C	GO	C	F	Sheb	V	Pier	Fu	DP		W	Full	U	4	Spic	Per	W	Shel	½Fl	10	49.2	Ros	36x5	40x5†	Cla		7260	160	72
O.K. 3½ T	4150	Buda YTU	4¼x6	28.9	L	G	RT	Fin	FS	Zen	V	Pier	Fu	DD	Eis		Full	A	4	Hart	Tut	W	Wis				Ros	36x5	36x5†				164	
Old Reliable C	4250	Wis UU	4¼x6	28.9	L	C	Chic	Fin	FS	Strm	V	Mon	Fu	DD	Bos		Full	A	4	Spic	Shel	W	Shel	½Fl	8.7	42.5	Ros	34x5	36x5†	StM		6650	160	75
Oneida D9	4350	Oneida	4½x5½	32.4	L	C	Own	C		Strm		Own		DP			Own	A	4	Own	Math	W	Own	½Fl	10	48		36x5	36x10			6830	170	
Orleans C	3900	Hev	4½x6	32.4	L	C	Chic	PT	F	Opt		Dup	D	D	Opt	Opt	Cott		4	Bld		W	Wis		10		Ros	36x5	36x5†			6125	172	80
Paige 51-18	4385	Cont E7	4½x5½	32.4	L	C	Own	Fin	S	Strm	G	Sim	BL	DD	Bos	Opt	B-Li	A	4	Spic	Per	W	Timk	Flot	10.3	50.01	Jac	36x5	36x5†	Opt	Fir	7000	160	85
Parker J20		Wis VAU	4½x6	32.4	L	C	Own	Fin	F	Strm	G	Mon	BL	DD	Bos	W	War	A	4	Bld		W	Own	Flot	8.75	43.6	Ros	38x7*	44x10*	Bim		6200	160	76
Republic 20	3845	Cont E4	4½x5½	32.4	L	C	Own	Fin	FS	Strm	G	Phar		DD	Bos		Full	U	4	Hart		I	Torb	D	10.3	48	Jac	36x5	36x10	Smi	Fir	6250	165	
Reynolds TA	4800	Hink HA	4½x5½	32.4	H	C	Lng	Fin	F	Strm	G	Hin	Co	DD	Bos	W	Covt	A	4	Sned	Per	W	Shel		8.7	44.36	Lav	36x5	36x5†	Smi			176	80
Sandow M	4395	Cont E4	4½x5½	32.4	L	G		Fin	FS	Strm	G	Mon		DD	Bos		B-Li	A	4	Spic	GC	W	Timk		10	42	Ros	36x5	36x5†	Pru		6500	175	70
Sanford W35	4050	Cont E4	4½x5½	32.4	L	G		Fin	F	Strm	G	Pier	BB		Bos		B-Li	A	4	Spic	Per	W	Sheb	½Fl	8.7		Ros	36x5	36x5†	Hoo	Fir	6750	174	75
Schacht		Buda XTU	4¼x6	28.9	L	G	Own		F	Sheb	G	Dup	Own		Bos		Own	A	4	M&E	Nat	W	Own				Own	36x5	36x5†	StM		6500	168	70
Selden 3½A	4325	Cont E7	4½x5½	32.4	L	G	Lng	Fin	FS	Strm	G	Pier	BL	D	Eis		B-Li	A	4	Spic	Per	W	Timk		8.7	42	Gem	36x5	36x10	Stn		7200	162	78
Service 71	4285	Buda HU	4¼x5½	28.9	L	C		Fin	F	Strm	G	Sim	BB	DP	Eis			A	4	Spic		W	Timk		8.7	42.3	Ros	36x5	36x5†			6930	171	70
Service 76	4485	Buda YU	4½x6	32.4	L	C		Fin	F	Strm	G	Sim	BB	DP	Eis			A	4	Spic		W	Timk		7.8	37.7	Ros	36x5	36x5†			7280	171	70
Signal M	4275	Cont E4	4½x5½	32.4	L	C	McC	Fin	FS	Strm	G	Pier	BL	DD	Eis		B-Li	A	4	Spic	Det	W	Timk	Flot	12	58.08	Ros	36x5	40x10	Hay		7780	168	78
Standard 66		Cont E4	4½x5½	32.4	L	G	Lng	Fin	F	Strm	V	Mon	BL	DD	Eis		B-Li	A	4	Spic	Per	W	Timk	Flot	10.3	50	Gem	36x5	36x5†			6480	160	70
Sterling 3½	4650	Ster DU	4½x6¼	32.4	L	C	Own	C	F	Rayf	V	Wau	ME	WD	Eis		Own	A	3	Spic	Math	W	Timk	Flot	8.75	39.5	Ros	36x5	40x5†	Pru		8300	162	92
Stewart 10	3995	Cont E7	4½x5½	32.4	L	G	Bus	PT	FS	Zen	G	Pier	Fu	DP	Eis		Full	U	4	Hart	Det	I	Cl	D	10	48	Ros	36x5	36x5†	Cla	Fir	6080	165	80
Stewart 10X	3995	Buda YTU	4½x6	32	R	P		T	FF	Zen	G	Pier	Full	DP	Eis		Full	U	4	Hart	Det	I	Cl	D	10.1	43.1	Ross	36x5	36x5	D-Cl	Fir		165	80
Tiffin PW	4375	Cont E4	4½x5½	32.4	L	P		Fin	S	Sheb	G	Pier	BB		Bos		Full	A	4	Acm	Kal	W	Shel		8.7	41.7	Ros	36x5	36x5†	Smi	Gdy	6850	160	80
Titan 3½	4550	Buda YTU	4½x6	32.4	L	P	B&W	ZZT	F	Strm	G	Sim	BB	DP	Eis		Cott	A	4	UP	Math	I	Cl	D	9	48	Lav	36x5	40x5†	Day		7300	156	70
Tower G3½	4335	Cont E4	4½x5½	32.4	L	C		PT	S	Strm	G	Pier	Fu	DP	Eis		Full	U	4	Spic	Det	W	Timk	Flot	10	50	Ros	36x5	36x5†	Pru		7010	165	70
Twin City 3½		Own	4¼x6	28.9	H	C	Spi		F	Sheb	V	Own	BB		Bos		Full	A	4	Spic	Math	W	Timk		10	49.58	Ros	36x5	40x5†	Smi		6800	168	80
Twin City 4 Wheel D. B.	4750	Wis JA	5½x6	42		T		C	FS	Strm	G	Pier	ME	WD	KW		Cott	A	3			I		½Fl			Ros	36x5	36x6	Arc		7200	146	60
United C	3750	Buda HTU	4¼x5½	28.9	L	C			F	Strm	G	Sim	Fu		Eis	Opt	B-Li	A	4	Bld		I	Cl	D	10		Ros	36x5	36x5†	Cla	Fir		160	80
Victor M		Cont E4	4½x5½	32.4	L	C	Own		FS	Strm			BL		Bos		B-Li	A	4	Spic		W	Timk				Gem	36x5	36x5†			6600	176	
Ward LaFrance 4A	4490		4½x6¼	32.4	L	C		Fin	F	Zen	G		BL	DP	Ber		B-Li	A	4	M&E		W	Timk		7.8	37.75	Ros	36x5	36x5†	Smi		7750	162	85
Wichita O	4000	Beav JB	4¼x6	28.9	H	G	EM	C	F	Strm	G	Dup	Own	C	Ber		Cott	A	4	Own	Det	W	Shel	½Fl	11	61.10	Ros	36x5	36x5†	Smi		6500	165	80
Wilcox E		Buda	4½x6	32.4	L	G		Fin	S	Strm	G	Pier		C			Own	A	4	Own	Shel	W	Wis	½Fl	10	45.1	Own	36x5	36x5†			6600	147	75
Wilson G	4300	Cont L4	4½x5½	32.4	L	C		Fin	FS	Mar	G	Pier	BB	DP	Eis		Own	A	4	K-B	Per	W	Timk		8.7	42.3	Ros	36x5	36x5†	Smi		6800	160	80
Winther 70	4200	Wis TAU	4 x6	25.6	L	P	Brm	Fin	F	Mas	V		BB	DP	Eis	W	B-Li	A	4	Bld	Math	I	Cl	D	9	36	Ros	36x5.	36x5†	Cla	Fir	6400	150	85
4 Ton																																		
American	4575	Wis	4½x6	32.4	L	P	GO		F	Strm	G	Pier	D		Eis		Covt	A	4	Acm		W	Wis		10		Lav	36x5	36x5	Smi		6475	158	
Bessemer K2		Cont E7	4½x5½	32.4	L	C		C	FS	Strm	G	Pier	BB	DP	Bos		B-Li	A	4	Spic	Per	I	Torb	D	10	49.5	Ros	36x5	36x10†	Sch	Fir	6740	175	75
Diamond T-EL	5675	Own	4½x5½	32.4	L	C			F	Strm	G			DD	Bos			A	4	Spic	Math	W		Flot			Gem	36x6	40x6†			8625	180	
Denby 27	4400	Cont E7	4½x5½	32.4	L	G	Lng	PT	FS	Strm	G	Sim		DD	Eis		War	A	4	Pet	Det	I	Cl	D	10	49.9	Ros	36x5	36x5†	Smi		6890	170	78
Double-Drive B	4000	Buda HTU	4¼x5½	28.9	L	G		PT	F	Zen	V	Pier	BB	DD	Lor	Opt	Own	A	4	Own	Own	W	Own	½Fl	9.75	48.75	Lav	36x6	36x6	Stn			130	55
Gabriel F		Buda YU	4½x6	32.4	L				F	Rayf	G	Dup	BB		Bos	AL	B-Li	A	4	Spic	Mer	W	Timk		10		Gem	36x5	40x10	Smi	Fir	5800	180	65
Highway-Knight A		R & V-W	4 x6	25.6	S	T	Own	PT	F	Zen	V	Mon	Own	DP	Eis	Wg	Own	A	4	Ther		W	Shel		8.7	42.3	Ros	36x5	40x6†	Sch		7400	159	90
Jumbo 40	5200	Buda YU	4½x6	32.4	L	C	Own		F	Zen	G	Sim	BL		Eis	Opt	B-Li	U	4	Spic	Per	I	Cl	D	10		Jac	48x7*	44x10	Cla		6800	165	75
Kelly-Springfield K45	4550	Own	4½x6½	34.4	T	C	Lng	Fin	F	Zen	G	Pier	Own	C	Eis	W	Covt	A	3	Own	Per	C	Own	D	11	32.3	Gem	36x5	40x6†	StM		8125	150	93
Kimball E	5000	Wis RAU	4¾x6	36.1	L	C	Flex	PT	F	Zen	V	Dup	BL	DP	Ber	W	B-Li	A	4	Spic	US	W	Shel	½Fl	8.7	42.3	Ros	36x5	40x10	Smi	Fir	8100	Op	86
King Zeitler	5000	Cont E4	4½x5½	32.4	L	G		PT	FS	Strm	G	Pier	BL	DD	Bos		B-Li	A	4	Ther	Mer	W	Timk	Flot	10	49	Lav	36x5	40x5†	StM		7810	162	
Moreland 20G	4875	Cont B2	4¾x6	36.1	L	C	Own	Fin	F	Mill	G	Con		DD	Dix			A	4	Ther	US	W	Timk		7.8	37.7	Ros	36x5	40x5†	Smi		7460	156	55
Packard EE	4550	Own	4½x5½	32.4	L	C			F	Own	P	Own		DP	Dix	Bj		A	4	Spic		W		Flot	10	46	Own	36x5	40x5			7200	150	77
Riker BB	4700	Own	4¼x6	28.9	T	C		Fin	FS	Bb	G	Own		C	Ber	W				Own		W	Own	½Fl	10	42.5	Ros	36x5	36x6†	Hoo		6370	150	75
Rowe HW	4350	Wis UAU	4¼x6	28.9	L	C	Fed	H	F	Zen	G	Sim	BL	DP	Bos		B-Li	U	4	Spic	Shel	W	Shel		8.7	35	Ros	36x5	36x6†					

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Trade Name and Model	Chassis Price	ENGINE DETAILS: Make and Model Number 4 Cylinder unless otherwise noted	Bore and Stroke	N. A. C. C. Horsepower	Valve Arrange't	How Cooled	Radiator (Make)	Radiator (Type)	Lubrication	Carburetor	Fuel Feed	Governor (Make)	Clutch (Make)	Clutch (Type)	Ignition System	Engine Starter	GEARSET: Make	Location	Speeds	Universal (Make)	Springs (Make)	REAR AXLE: Final Drive	Make	Type	Total Gear Reduction in High	Total Gear Reduction in Low	Steering Gear (Make)	TIRES, WHEELS, RIMS: *Pneumatic †Dual Front	Rear	Wheels (Make)	Rim Equipment	Chassis Weight	Wheelbase	Pr. Cent of Weight on Rear Wheels
		1		2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20			21			22	23			
5½, 6, 7 Ton—Con'd																																		
Couple Gear LD6	7450	Wis	5¾x7	52.8	T	G	Idl	H	F	Strm	G	.....	.....	.....	Eis	Own	Own	...	5	Own	Tut	B	Own	.....	12	.....	Own	36x5†	36x6	Own	Own	12000	144	55
Mack AC	6000	Own AC	5 x6	40	L	C	Own	Fin	S	Zen	G	Own	Own	DP	Aer	.....	Own	UJ	3	Spic	Mer	C	Own	D	11	37.1	Own	36x7	40x7†	Sch	.....	9050	Op	73
Old Reliable K, L, M	6250	Wau P.	4¾x6¾	36.1	L	C	Chic	PT	FS	Strm	G	Wau	Wg	WD	Bos	.....	D-Se	A	4	Spic	Shel	C	Shel	D	10.86	54.9	Ros	36x6	40x7†	Smi	.....	10240	136	78
Available H7	6000	Own	5 x6¼	40	L	C	Chic	Fin	FS	Strm	V	Wau	BL	DD	Bos	.....	B-Li	A	4	Spic	.....	R	Sav	½Fl	14	57.6	Ros	36x6	40x14	Smi	.....	10300	190	90
Royal 7	.....	Wis RBU	5¼x7	44.1	...	C	.....	H	...	Strm	...	Mon	.....	WD	Bos	Op	Own	A	..	.....	Mer	W	Timk	.....	.....	.....	Ros	36x7	40x7†	.....	.....	.....	168	....
Sterling 7½-Chain	6500	Ster EU	5x6¼	40	L	C	Own	C	...	Rayf	V	Wau	ME	WD	Eis	.....	Own	A	6	UM	Mat	C	Own	D	7.04	43.6	Ros	36x6	40x7†	Pru	.....	11000	174	91
Wichita S	5000	Beav JB	4½x6	32.4	H	P	EM	C	F	Strm	G	Dup	Own	C	Ber	.....	Own	A	4	Own	Det	R	Own	½Fl	14	66.2	Ros	36x6	40x6†	Smi	.....	9200	165	90
Gasoline Tractor Trucks																																		
Columbia GT	2850	Hink HAA	4 x5¼	25.6	L	C	Lng	Fin	FS	Strm	...	Hink	Det	DP	Bos	U	Cott	A	4	Spic	Per	I	Rus	D	9.5	40.7	Own	36x4	36x7	Det	Fir	4200	112	80
Federal Light Duty	3325	Cont C4	4¼x5¼	27.2	L	C	Own	Fin	FS	Zen	G	Phar	BB	DP	Eis	.....	Own	A	4	Spic	Math	W	Timk	.....	9.2	59.8	Gem	36x4	36x7	.....	Fir	4700	110	....
Federal Heavy Duty	4300	Cont E4	4½x5½	32.4	L	C	Own	Fin	FS	Zen	G	Phar	BB	DP	Eis	.....	Own	A	4	Spic	Math	W	Timk	.....	12	48.8	Gem	36x5	36x5†	.....	Fir	6800	114	....
Garford 70H	3550	Buda HTU	4¼x5½	28.9	L	C	.....	Fin	F	Strm	G	Sim	BL	DD	Spl	.....	.....	...	4	Spic	Per	W	Timk	.....	.....	.....	Ros	36x4	36x7	.....	.....	4750	119	....
Garford 77C	.....	Wis AU	4¾x5½	36.1	T	C	.....	Fin	F	Rayf	G	Sim	BL	DD	Eis	.....	.....	...	4	Spic	Per	W	Timk	.....	.....	.....	Ros	36x5	40x5†	Smi	.....	7200	105	....
Garford 68	5300	Wis JU	5.1x5½	41.6	T	C	.....	.....	F	Rayf	G	Sim	BL	.....	Eis	.....	.....	...	4	Spic	Per	C	.....	D	.....	.....	Ros	36x6	40x6	Smi	.....	8450	102	....
Hewitt-Ludlow 6-Ton	.....	Buda HTU	4¼x5½	28.9	...	...	.....	.....	F	Strm	...	.....	BB	.....	Bos	.....	.....	...	..	Spic	.....	C	.....	D	.....	.....	Lav	36x5	36x4†	.....	.....	4000	.....	....
Hood	1425	Own	3¾x3¾	22.5	T	C	Idl	.....	S	Holl	G	.....	.....	D	.....	.....	.....	U	2	Own	Lah	C	Own	.....	8	24	Own	20x3½	20x5	Own	.....	2900	60	65
Jumbo C	3450	Buda HTU	4¼x5½	28.9	L	C	GO	.....	F	Zen	G	Dup	Fu	.....	Eis	Op	Full	U	3	Arv	Det	I	Cl	D	9	.....	Jac	36x4	36x7	Day	.....	4450	152	60
Knox 35	6000	Own 35	5 x5½	40	H	C	Fed	H	F	Zen	V	.....	.....	DP	.....	GD	.....	A	3	.....	.....	W	Timk	.....	1	.....	Ros	36x4	38x6†	Wau	.....	8500	108	60
Knox 36—3-Ton	6500	Own 35	5x5½	40	H	C	Fed	H	F	Zen	V	.....	.....	DP	.....	GD	.....	A	3	.....	.....	W	Timk	.....	1	.....	Ros	36x4	38x6†	Wau	.....	10000	108	....
Koehler MT	3450	Her CU3	4 x5½	25.6	L	C	.....	.....	F	Zen	G	Sim	BL	D	Eis	.....	B-Li	A	4	Spic	Math	W	Timk	.....	9.25	37	Lav	36x4	36x7†	Wau	.....	4750	142	....
Kuhn	.....	Wis	4¼x5½	28.9	T	C	.....	H	S	Rayf	...	.....	.....	C	Bos	.....	.....	...	4	.....	.....	B	Own	.....	.....	.....	.....	36x7	36x7†	.....	.....	9000	138	....
Lombard	.....	Spec 6	5½x6¾	72.7	...	C	Spec	H	F	Sheb	P	.....	.....	D	.....	.....	Spec	A	..	.....	.....	W	.....	.....	.....	.....	Spe	.....	.....	.....	.....	8000	...	90
Mack AB 5-Ton	3400	Own AB	4 x5	25.6	L	C	Own	C	S	Zen	G	Own	BL	DD	Aer	.....	B-Li	U	4	Bld	Mer	C	Own	D	10.5	42.2	Own	36x4	36x4†	Sch	.....	4940	120	....
Mack AC 7-Ton	4950	Own AC	5 x6	40	L	C	Own	PT	S	Zen	G	Own	Own	DP	Aer	.....	Own	UJ	3	Spic	Mer	C	Own	D	10.7	34.6	Own	36x5	40x5†	Sch	.....	7670	119	....
Mack AC 10-Ton	5500	Own AC	5 x6	40	L	C	Own	PT	S	Zen	G	Own	Own	DP	Aer	.....	Own	UJ	3	Spic	Mer	C	Own	D	11.5	37.1	Own	36x6	40x6†	Sch	.....	8250	119	....
Mack AC 13-Ton	5750	Own AC	5 x6	40	L	C	Own	PT	S	Zen	G	Own	Own	DP	Aer	.....	Own	UJ	3	Spic	Mer	C	Own	D	12.9	41.5	Own	36x6	40x12	Sch	.....	8272	119	....
Mack AC 15-Ton	6000	Own AC	5 x6'	40	L	C	Own	PT	S	Zen	G	Own	Own	DP	Aer	.....	Own	UJ	3	Spic	Mer	C	Own	D	14.1	45.2	Own	36x7	40x7†	Sch	.....	8650	119	....
Master T	3740	Buda HU	4¼x5½	28.9	L	C	Chic	PT	FS	Mas	G	McC	BL	DP	Eis	.....	B-Li	U	4	Spic	Det	I	Walk	.....	8	32	Ros	34x4	36x4†	Pru	.....	4500	110	76
Rennoc 8-Ton	.....	Buda	4½x5½	27.2	L	C	.....	.....	F	Strm	...	Pier	.....	D	Spl	.....	War	...	4	Hart	Row	W	Wis	.....	.....	.....	Lav	35x5	36x7	.....	.....	5050	116	60
Watson	4050	Cont E4	4½x5½	32.4	L	G	Jam	C	FS	Strm	G	Pier	.....	DP	Bos	.....	B-Li	A	4	Spic	Shel	W	Timk	.....	.....	.....	Gem	34x4	36x10	.....	.....	6500	80	37

Electric Commercial Cars

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E. C. M. Name and Model Number	Carrying Capacity	Chassis Weight	Chassis Price	Maximum Speed	Battery	Mileage Per Charge	Motor	Controller	Speeds Forward	Drive	Rear Axle	Springs	Front Tires	Rear Tires	Steering Gear	Wheelbase	Pr. Cent of Weight on Rear Wheels
Ward WS	750	1400	.....	12	Edis	45	G-E	Own	4	W	Shel	Shel	32x2½	32x3	Own	88	60
C-T ½	1000	1800	1900	14	Opt	60	G-E	Own	4	C-T	Flot	Shel	36x3	36x3	W	89¼	60
Walker M	1000	2300	.....	15	Opt	60	West	West	5	O	Own	Math	34x3	36x3½	Ross	93	66
Atlantic 1C	2000	2770	.....	12	Opt	.....	G-E	G-E	4	C	Timk	S-El	34x4	36x4	Ross	103	65
Ward WA	1250	2730	.....	12	Edis	47	G-E	G-E	4	W	Shel	Shel	32x3	34x3¼	Own	90	60
C-T 1	2000	2500	2300	14	Opt	60	G-E	Own	4	C-T	Flot	Shel	36x3½	36x4	W	101	60
Walker K	2000	2700	.....	14	Opt	60	West	West	5	O	Own	Math	34x3½	36x4	Ross	96	66
Ward WB	2000	3430	.....	10	Edis	43	G-E	G-E	4	W	Shel	Shel	34x3½	36x4	Own	102	60
Atlantic 2C	4000	3590	.....	11	Opt	.....	G-E	G-E	4	C	Timk	S-El	34x4	36x3†	Ross	115	65
C-T 2	4000	3500	2700	12	Opt	60	G-E	Own	4	C-T	Flot	Shel	36x4	36x4†	W	116	60
Walker L	4000	3800	.....	13	Opt	60	West	West	5	O	Own	Math	38x4	38x6	Ross	112	66
Ward WD	4000	4500	.....	8.5	Edis	35	G-E	G-E	4	W	Shel	Shel	36x4	36x7	Own	114	60
Atlantic 3C	7000	5220	.....	10	Opt	.....	G-E	G-E	5	C	Timk	.....	36x5	40x5†	Ross	135	65
C-T 3½	7000	5000	3900	11	Opt	50	G-E	Own	4	I	Dead	Shel	36x6†	36x4†	W	122	55
Ward WF	7000	6600	.....	7	Edis	30	G-E	G-E	4	W	Shel	Shel	36x5	36x8	Own	132	60
Atlantic 5C	10000	6230	.....	9	Opt	.....	G-E	G-E	5	C	Timk	S-El	36x6	40x5†	Ross	144	65
Couple Gear H	7000	9000	.....	10	Phil	30	Own	Own	5	B	Own	Tut	36x5†	36x5†	Own	96	55
Couple Gear	10000	10000	.....	7	Phil	30	Own	Own	5	B	Own	Tut	36x5†	36x5†	Own	96	75
C-T 5	10000	6000	4400	10	Opt	50	G-E	Own	4	I	Dead	Shel	36x7	36x5†	W	132	55
Walker P	7000	5600	.....	11	Opt	50	West	West	5	O	Own	Math	36x5	38x5†	Ross	131	66
Walker N	10000	6400	.....	10	Opt	50	West	West	5	O	Own	Math	36x6	38x6†	Ross	141	66
Ward WH	10000	8375	.....	6	Edis	26	G-E	G-E	4	W	Shel	Shel	36x7	40x10	Own	144	60
Atlantic 6C	13000	6940	.....	8	Opt	.....	G-E	G-E	5	C	Timk	S-El	36x6	40x6	Ross	156	65
Couple Gear	14000	11000	.....	10	Phil	30	Own	Own	5	B	Own	Tut	36x5†	36x5	Own	96	55

Manufacturers Whose Models Are Included in Specifications on Preceding Pages

Acason—Acason Motor Truck Co., Detroit, Mich.
Ace—American Motor Truck Co., Newark, Ohio.
Acme—Acme Motor Truck Co., Cadillac, Mich.
All-American—All-American Truck Co., Chicago, Ill.
American—American Motor Truck & Tractor Co., New York, N. Y.
Apex—Hamilton Motor Co., Grand Haven, Mich.
Armleder—O. Armleder Co., Cincinnati, Ohio.
Atco—American Truck & Trailer Corp., Kankakee, Ill.
Atlantic—Atlantic Electric Vehicle Co., Newark, N. J.
Atlas—Atlas Truck Corp., York, Pa.
Atterbury—Atterbury Motor Car Co., Buffalo, N. Y.
Autocar—Autocar Co., Ardmore, Pa.
Available—Available Truck Co., Chicago, Ill.

Beck-Hawkeye—Beck-Hawkeye Motor Truck Works, Cedar Rapids, Iowa.
Bell—Iowa Motor Truck Co., Ottumwa, Ia.
Belmont—Belmont Motors Corp., Lewistown, Pa.
Bessemer—Bessemer Motor Truck Co., Grove City, Pa.
Bethlehem—Bethlehem Motor Truck Corp., Allentown, Pa.
Betz—Betz Motor Truck Co., Hammond, Ind.
Birch—Birch Motor Cars, Chicago, Ill.
Brinton—Brinton Motor Truck Co., Philadelphia, Pa.
Brockway—Brockway Motor Truck Co., Cortland, N. Y.

C. T.—Commercial Truck Co., Philadelphia, Pa.
Capitol—Capitol Motors Corp., Fall River, Mass.
Champion—Champion Motors Corp., Philadelphia, Pa.
Chevrolet—Chevrolet Motor Co. of Mich., Flint, Mich.
Chicago—Chicago Motor Truck, Inc., Chicago, Ill.
Clydesdale—Clydesdale Motor Truck Co., Clyde, Ohio.
Collier—Collier Motor Truck Co., Bellevue, Ohio.
Columbia—Columbia Motor Truck & Trailer Co., Pontiac, Mich.
Comet—Comet Automobile Co., 156 S. Water St., Decatur, Ill.
Commerce—Commerce Motor Car Co., Detroit, Mich.
Concord—Abbot-Downing Truck & Body Co., Concord, N. H.
Conestoga—Conestoga Motor Truck Co., Lancaster, Pa.
Cook—Cook Motors Corp., Kankakee, Ill.
Corbitt—Corbitt Motor Truck Co., Henderson, N. C.
Couple Gear—Couple Gear Freight Wheel Co.., Grand Rapids, Mich.

Dart—Dart Truck & Tractor Corp., Waterloo, Ia.
Day-Elder—Day-Elder Motors Corp., Newark, N. J.
Dearborn—Dearborn Truck Co., Chicago, Ill.
Defiance—Defiance Motor Truck Co., Defiance, Ohio.
DeKalb—DeKalb Wagon Co., DeKalb, Ill.
Denby—Denby Motor Truck Co., Detroit, Mich.
Dependable—Dependable Truck & Tractor Co., Galesburg, Ill.
Diamond T—Diamond T Motor Car Co., Chicago, Ill.
Diehl—Diehl Motor Truck Works, Philadelphia, Pa.
Doane—Doane Motor Truck Co., San Francisco, Cal.
Dodge—Dodge Bros., Detroit, Mich.
Dorris—Dorris Motor Car Co., St. Louis, Mo.
Double Drive—Double Drive Truck Co., Chicago, Ill.
Douglas—Douglas Motors Corp., Omaha, Nebr.
Duplex—Duplex Truck Co., Lansing, Mich.
Duryea—Duryea Motors, Inc., Philadelphia, Pa.
Duty—Duty Motor Co., Greenville, Ill.

Eagle—Eagle Motor Truck Corp., St. Louis, Mo.
Ellsworth—Mills-Ellsworth Co., Keokuk, Ia.
Elmira—Elmira Commercial Motor Car Co., Inc., Owego, N. Y.
Erie—Erie Motor Truck Mfg. Co., Erie, Pa.

F. W. D.—Four Wheel Drive Auto Co., Clintonville, Wis.
Fageol—Fageol Motors Co., Oakland, Cal.
Famous—Famous Trucks, Inc., St. Joseph, Mich.
Fargo—Fargo Motor Truck Co., Chicago, Ill.
Federal—Federal Motor Truck Co., Detroit, Mich.
Ford—Ford Motor Co., Highland Park, Mich.
Forschler—Forschler Motor Truck Mfg. Co., New Orleans, La.
Front Drive—Double Drive Truck Co., Chicago, Ill.
Fulton—Fulton Motors Corp., New York, N. Y.

G. M. C.—General Motors Truck Co., Pontiac, Mich.
Garford—Garford Motor Truck Co., Lima, Ohio.
Gary—Gary Motor Truck Co., Gary, Ind.
Gersix—Gersix Mfg. Co., Seattle, Wash.
Giant—Giant Truck Corp., Chicago Heights, Ill.
Graham—Graham Brothers, Evansville, Ind.
Gramm-Bernstein—Gramm-Bernstein Motor Truck Co., Lima, Ohio.
Grant—Grant Motor Car Corp., Truck Division, Cleveland, Ohio.

Hahn—Hahn Motor Truck & Wagon Co., Hamburg, Pa.
Hall—Lewis-Hall Motors Corp., Detroit, Mich.
Harvey—Harvey Motor Truck Co., Harvey, Ill.
Hawkeye—Hawkeye Truck Co., Sioux City, Ia.
Hendrickson—Hendrickson Motor Truck Co., Chicago, Ill.
Hewitt-Ludlow—Ralston Iron Works, San Francisco, Cal.
Highway-Knight—Highway Motors Co., Chicago, Ill.
Higrade—Higrade Motors Co., Harbor Springs, Mich.
H. & M—H & M Motor Truck Co., Inc., Baltimore, Md.
Hood—Hood Mfg. Co., Seattle, Wash.
Hoover—Hoover Wagon Co., York, Pa.
H. R. L.—H. R. L. Motor Co., Seattle, Wash.
Huffman—Huffman Bros. Co., Elkhart, Ind.
Hurlburt—Harrisburg Mfg. & Boiler Co., Harrisburg, Pa.

Independent—Independent Motor Co., Youngstown, O.
Independent—Independent Motor Truck Co., Inc., Davenport, Ia.
Indiana—Indiana Truck Corp., Marion, Ind.
International—International Harvester Co., Chicago, Ill.

Jackson—Jackson Motors Corp., Jackson, Mich.
Jumbo—Nelson Motor Truck Co., Saginaw, Mich.

Kalamazoo—Kalamazoo Motor Corp., Kalamazoo, Mich.
Kankakee—Kankakee Automobile Co., Kankakee, Ill.
Karavan—Caravan Motors Co., Portland, Ore.
Kearns—Kearns-Dughie Motors Co., Beavertown, Pa.
Keldon—House Cold Tire Setter Co., St. Louis, Mo.
Kelly-Springfield—Kelly-Springfield Motor Truck Co., Springfield, Ohio.
Keystone—Keystone Motor Truck Corp., Philadelphia, Pa.
Kimball—Kimball Motor Truck Co., Los Angeles, Cal.
King Zeitler—King Zeitler Co., Chicago, Ill.
Kissel—Kissel Motor Car Co., Hartford, Cal.
Kleiber—Kleiber & Co., Inc., San Francisco, Cal.
Knox—Knox Motors Co., Springfield, Mass.
Koehler—H. J. Koehler Motors Corp., Bloomfield, N. J.
Kuhn—Kuhn Tractor Truck Co., Seattle, Wash.

Lange—Lange Motor Truck Co., Pittsburgh, Pa.
Larrabee-Deyo—Larrabee-Deyo Motor Truck Co., Inc., Binghamton, N. Y.
L. M. C.—Louisiana Motor Car Co., Shreveport, La.
Lombard—Lombard Auto Tractor Truck Corp., New York, N. Y.
Lone Star—Lone Star Truck & Tractor Assn., San Antonio, Texas.
Luedinghaus—Luedinghaus-Espenschied Wagon Co., St. Louis, Mo.
Luverne—Luverne Automobile Co., Luverne, Minn.

Maccar—Maccar Truck Co., Scranton, Pa.
MacDonald—MacDonald Truck & Tractor Co., San Francisco, Cal.
Mack—International Motor Co., New York, N. Y.
Marshall—Marshall Mfg. Co., Chicago, Ill.
Master—Master Trucks, Inc., Chicago, Ill.
Maxwell—Maxwell Motor Co., Inc., Detroit, Mich.
Menominee—Menominee Motor Truck Co., Menominee, Mich.
Moreland—Moreland Motor Truck Co., Los Angeles, Cal.
Muskegon—Muskegon Engine Co., Muskegon, Mich.
Mutual—Mutual Truck Co., Sullivan, Ind.

Napoleon—Napoleon Motors Co., Traverse City, Mich.
Nash—Nash Motors Co., Kenosha, Wis.
Nelson-LeMoon—Nelson & LeMoon, Chicago, Ill.
Netco—New England Truck Co., Fitchburg, Mass.
Niles—Niles Motor Truck Co., Pittsburgh, Pa.
Noble—Noble Motor Truck Co., Kendallville, Ind.
Northway—Northway Motors Co., Natick, Mass.
Northwestern—Starr Carriage Co., Seattle, Wash.
Norwalk—Norwalk Motor Car Co., Martinsburg, W. Va.

O. K.—Oklahoma Auto Mfg. Co., North Muskogee, Okla.
Ogden—Ogden Motor & Supply Co., Chicago, Ill.
Old Hickory—Kentucky Wagon Mfg. Co., Louisville, Ky.
Old Reliable—Old Reliable Motor Truck Co., Chicago, Ill.
Oldsmobile—Olds Motor Works, Lansing, Mich.
Oneida—Oneida Motor Truck Co., Green Bay, Wis.
Orleans—New Orleans Motor Truck Mfg. Co., New Orleans, La.
Oshkosh—Oshkosh Motor Truck Mfg. Co., Oshkosh, Wis.

Packard—Packard Motor Car Co., Detroit, Mich.
Paige—Paige-Detroit Motor Car Co., Detroit,, Mich.
Parker—Parker Motor Truck Co., Milwaukee, Wis.
Patriot—Patriot Motors Co., Lincoln, Neb.
Pierce-Arrow—Pierce-Arrow Motor Car Co., Buffalo, N. Y..
Pioneer—Pioneer Truck Co., Chicago, Ill.
Pittsburgher—Pittsburgh Truck Mfg. Co., Pittsburgh, Pa.
Pony—Minnesota Machinery & Foundry Co., Minneapolis, Minn.

Rainier—Rainier Motor Corp., Flushing, L. I., N. Y.
Reliance—Reliance Motor Truck Co., Appleton, Wis.
Rennoc—Rennoc-Leslie Motor Co., Philadelphia, Pa.
Reo—Reo Motor Car Co., Lansing, Mich.
Republic—Republic Motor Truck Co., Inc., Alma, Mich.
Reynolds—Reynolds Motor Truck Co., Mt. Clemens, Mich.
Riker—Locomobile Co. of America, Bridgeport, Conn.
Rowe—Rowe Motor Mfg. Co., Lancaster, Pa.
Royal—Royal Motor Truck of N. Y., New York, N. Y.

Sandow—Sandow Motor Truck Co., Chicago, Ill.
Sanford—Sanford Motor Truck Co., Syracuse, N. Y.
Schacht—G. A. Schacht Motor Truck Co., Cincinnati, O.
Schwartz—Schwartz Motor Truck Co., Reading, Pa.
Selden—Selden Truck Corp., Rochester, N. Y.
Seneca—Seneca Motor Car Co., Fostoria, O.
Service—Service Motor Truck Co., Wabash, Ind.
Shaw—Walden W. Shaw Livery Co., Chicago, Ill.
Signal—Signal Motor Truck Co., Detroit, Mich.
Southern—Southern Truck & Car Corp., Greenboro, N. C.
Standard—Standard Motor Truck Co., Detroit, Mich.
Sterling—Sterling Motor Truck Co., Milwaukee, Wis.
Stewart—Stewart Motor Corp., Buffalo, N. Y.
Stoughton—Stoughton Wagon Co., Stoughton, Wis.
Success—Webberville Truck Co., Webberville, Mich.
Sullivan—Sullivan Motor Truck Co., Atlanta, Ga.
Superior—Superior Motor Truck Co., Atlanta, Ga.

Texan—Texas Motor Car Asso., Fort Worth, Texas.
Tiffin—Tiffin Wagon Co., Tiffin, Ohio.
Titan—Titan Truck Co., Milwaukee, Wis.
Tower—Tower Motor Truck Co., Greenville, Mich.
Traffic—Traffic Motor Truck Corp., St. Louis, Mo.
Transport—Transport Truck Co., Mt. Pleasant, Mich.
Traylor—Traylor Eng. & Mfg. Co., Cornwells, Pa.
Triangle—Triangle Motor Truck Co., St. Johns, Mich.
Triumph—Triumph Truck & Tractor Co., Kansas City, Mo.
Twin City F. W. D.—Twin City Four Wheel Drive Co., Inc., St. Paul, Minn.
Twin City—Minneapolis Steel & Mach. Co., Minneapolis, Minn.

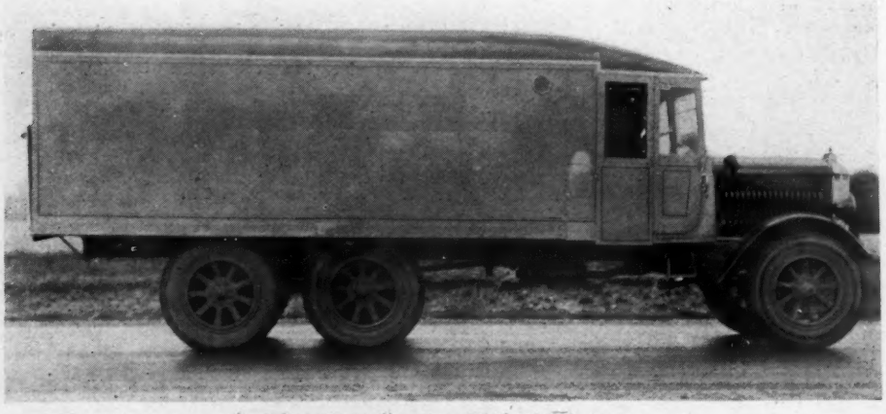
Ultimate—Vreeland Motor Co., Inc., Newark, N. J.
Union—Union Motor Truck Co., Bay City, Mich.
United—United Motors Co., Grand Rapids, Mich.
U. S.—United States Motor Truck Co., Cincinnati, Ohio.

Velie—Velie Motors Corp., Moline, Ill.
Victor—Victor Motor Truck & Trailer Co., Chicago, Ill.
Vim—Vim Motor Truck Co., Philadelphia, Pa.

Walker—Walker Vehicle Co., Chicago, Ill.
Walker-Johnson—Walker-Johnson Truck Co., Woburn, Mass.
Walter—Walter Motor Truck Co., New York, N. Y.
Ward—Ward Motor Vehicle Co., Mt. Vernon, N. Y.
Ward La France—Ward La France Truck Co., Inc., Elmira, N. Y.
Ware—Ware Twin Engine Truck Co., Minneapolis, Minn.
Watson—Watson Wagon Co., Canastota, N. Y.
Wells—Evans Truck & Axle Co., Auburn, Ind.
White—White Co., Cleveland, Ohio.
White Hickory—White Hickory Motor Corp., Atlanta, Ga.
Wichita—Wichita Falls Motor Co., Wichita Falls, Tex.
Wilcox—H. E. Wilcox Motor Co., Minneapolis, Minn.
Wilson—J. C. Wilson Co., Detroit, Mich.
Winther—Winther Motor Truck Co., Kenosha, Wis.
Witt-Will—Witt-Will Co., Inc., Washington, D. C.
Wolverine—American Commercial Car Co., Detroit, Mich.

Price List, Maximum Capacities and Inflation Pressures of Large Size Pneumatic Tire Casings

	36 x 6			38 x 7			40 x 8			42 x 9			44 x 10		
	Price	Carrying Capacity	Inflation Pressure	Price	Carrying Capacity	Inflation Pressure	Price	Carrying Capacity	Inflation Pressure	Price	Carrying Capacity	Inflation Pressure	Price	Carrying Capacity	Inflation Pressure
Amazon Rubber Co., Akron, O.															
Amazon Cord, non-skid	123.85	2000	106	.....	....	...	.....	....	...	.....	....	...	.....	....	...
American Rubber & Tire Co., Akron, O.															
Americord, non-skid	117.75	....	...	166.00	....	...	213.85	....	...	.....	....	...	.....	....	...
Bergougnan Rubber Corp., Trenton, N. J.															
Bergougnan Cord, non-skid	141.10	2000	90	184.55	2700	100	239.10	3650	110	.....	....	...	.....	....	...
Braender Rubber & Tire Co., Rutherford, N. J.															
Braender Super Cord, non-skid	132.50	2200	90	187.35	3000	100	241.40	4000	110	.....	....	...	.....	....	...
Brunswick-Balke-Collander Co., Chicago, Ill.															
Brunswick Cord, Skid-Not	128.90	....	95	182.30	....	105	234.85	....	115	.....	....	...	.....	....	...
Curtis Tire & Rubber Co., Muskegon, Mich.															
Curtis Cord, Road	119.35	2200	90	.....	....	...	.....	....	...	.....	....	...	.....	....	...
Empire Tire & Rubber Co., Trenton, N. J.															
Empire Cord, non-skid	119.35	2000	90	168.80	2700	100	217.45	3650	110	.....	....	...	.....	....	...
Falls Rubber Co., Cuyahoga Falls, O.															
Falls Cord, Neverslip	140.00	2200	90	180.00	3000	100	230.00	4000	110	.....	....	...	.....	....	...
Federal Rubber Co. of Ill., Cudahy, Wis.															
Federal Cord, non-skid	119.35	2300	90	168.80	3000	100	217.45	4000	110	.....	....	...	.....	....	...
Firestone Tire & Rubber Co., Akron, O.															
Firestone Cord, non-skid	119.35	2200	90	168.80	3000	100	217.45	4000	110	272.35	5000	120	380.65	6000	130
Fisk Rubber Co., Chicopee Falls, Mass.															
Fisk Cord, non-skid	119.35	2200	90	168.80	3000	100	217.45	4000	110	272.35	5000	120	380.65	6000	130
General Tire & Rubber Co., Akron, O.															
General Cord, non-skid	130.85	2200	90	185.15	3000	100	238.50	4000	110	298.65	5000	120	417.45	6000	130
Goodrich, B. F. Rubber Co., Akron, O.															
Goodrich Cord, Ribbed	119.35	2200	90	168.80	3000	100	217.45	4000	110	.....	....	...	.....	....	...
Goodrich Cord, Safety	119.35	2200	90	168.80	3000	100	217.45	4000	110	.....	....	...	.....	....	...
Goodyear Tire & Rubber Co., Akron, O.															
Goodyear Cord, Ribbed	119.35	2200	100	168.80	3000	110	217.45	4000	120	.....	....	...	.....	....	...
Goodyear Cord, All-Weather	119.35	2200	100	168.80	3000	110	217.45	4000	120	272.35	5000	130	380.65	6000	140
Hewitt Rubber Co., Buffalo, N. Y.															
Hewitt Cord, non-skid	132.60	2000	90	187.50	2850	100	.....	....	...	.....	....	...	.....	....	...
Howe Rubber Co., Inc., New Brunswick, N. J.															
Howe Ultra Cord, non-skid	127.25	2000	90	.....	....	...	.....	....	...	.....	....	...	.....	....	...
India Tire & Rubber Co., Akron, O.															
India Cord, non-skid	143.20	2200	90	202.50	3000	100	295.00	4000	110	.....	....	...	.....	....	...
International India Rubber Corp., South Bend, Ind.															
Odell Cord, rough	119.35	2000	90	168.80	2700	100	.....	....	...	.....	....	...	.....	....	...
Kelly-Springfield Tire Co., Cleveland, O.															
Kelly-Springfield Cord, grooved	140.00	....	...	188.00	....	...	236.00	....	...	.....	....	...	.....	....	...
Kelly-Springfield Cord, BB	140.00	....	...	188.00	....	...	236.00	....	...	.....	....	...	.....	....	...
McGraw Tire & Rubber Co., Cleveland, O.															
McGraw Cord, ribbed	131.25	....	...	.....	....	...	.....	....	...	.....	....	...	.....	....	...
McGraw Cord, non-skid	131.25	....	...	.....	....	...	.....	....	...	.....	....	...	.....	....	...
Marathon Tire & Rubber Co., Cuyahoga Falls, O.															
Marathon Cord, Angle	120.00	2200	100	.....	....	...	.....	....	...	.....	....	...	.....	....	...
Mason Tire & Rubber Co., Kent, O.															
Mason Cord, non-skid	119.35	2200	90	156.10	3000	100	216.40	3750	100	.....	....	...	.....	....	...
Miller Rubber Co., Akron, O.															
Miller Cord, Geared-to-the-Road	125.65	2200	90	177.65	3000	100	228.90	4000	110	.....	....	...	.....	....	...
Mohawk Rubber Co., Akron, O.															
Mohawk Cord, non-skid	136.00	2200	90	190.00	3000	100	240.00	4000	110	.....	....	...	.....	....	...
Norwalk Tire & Rubber Co., Norwalk, Conn.															
Norwalk Cord, non-skid	125.20	2000	90	.....	....	...	.....	....	...	.....	....	...	.....	....	...
Oldfield Tire Co., Cleveland, O.															
Oldfield Cord, anti-skid	125.30	2200	90	177.25	3000	100	228.30	3725	100	.....	....	...	.....	....	...
Pennsylvania Rubber Co., Jeannette, Pa.															
Vacuum Cup Cord	108.40	2200	90	153.35	3000	100	197.60	4000	110	.....	....	...	.....	....	...
Perfection Tire & Rubber Co., Fort Madison, Ia.	119.35	2200	90	168.80	3000	100	217.40	4000	110	.....	....	...	.....	....	...
Portage Rubber Co., Barberton, O.															
Portage Cord, Daisy	132.00	....	...	176.00	....	...	.....	....	...	.....	....	...	.....	....	...
Racine Rubber Co., Racine, Wis.															
Racine Multi Mile Cord, non-skid	117.85	2200	90	166.65	3000	100	214.75	4000	110	.....	....	...	.....	....	...
Republic Rubber Co., Youngstown, O.															
Republic Grande Cord, Staggard Tread	129.00	2200	90	182.45	3000	100	235.05	4000	110	.....	....	...	.....	....	...
Star Rubber Co., Akron, O.															
Star Cord, "All Star"	144.00	2200	90	192.00	3000	100	240.00	4000	110	.....	....	...	.....	....	...
Swinehart Tire & Rubber Co., Akron, O.															
Swinehart Cord, Hexagon	119.35	2000	90	.....	....	...	.....	....	...	.....	....	...	.....	....	...
United States Tire Co. New York City.															
U. S. Nobby Cord	119.35	2200	90	168.80	3000	100	217.45		110	272.35	5000	120	380.65	6000	130



The Goodyear Six-Wheel Truck

The body is one of the largest in the country with a capacity greater than any other motor vehicle ever constructed. This six-wheel pneumatic-equipped chassis is the result of exhaustive research and experimentation conducted by the Goodyear Co. early in the year.

Importance of Crankcase Lubrication Demonstrated

A recent test showed that to prevent excessive engine wearing, crankcase oil should be changed at least every 1500 miles, preferably every 1000 miles.

A new engine that was run 6000 miles with oil changed at proper intervals, upon being disassembled showed no signs of wear. The same engine, reassembled and run 6000 miles with old oil plus new oil as needed, upon inspection, showed a wear of 0.015 in.

Truck and passenger car manufacturers recommend, for better performance and longer life, that crankcases be drained every thousand miles, the engine flushed with kerosene and new oil added.

Business Methods Place Motor Transportation Lines on Profitable Basis

Transportation Company, With Terminals in Eight Towns, Makes Speedy Deliveries With Pneumatic Tire-Equipped Trucks. Business Growing Rapidly

By C. S. PERRIE

BELIEVING that there is a future for the motor highway transportation company which gives dependable service to shippers and manufacturers, the Central N. Y. Motor Transportation Lines, with headquarters in Syracuse, N. Y., is developing a service that covers a radius of approximately 73 miles. This concern is the successor to a transportation company that did not, it is said, make a success of motor highway transportation.

That the new organization is on the road to success is indicated by the fact that it is employing eight trucks and a converted passenger car and that additions to the fleet are contemplated. The cities and towns in which terminals are located are as follows: Watertown, 73 miles; Cortland, 37 miles; Ilion, 52 miles; Utica, 52 miles; Rome, 50 miles; Oneida, 37 miles; Oswego, 36 miles, and Geneva, 52 miles.

Each of these routes is served daily, Sunday excepted, by one or more trucks, depending upon the volume of business. The truck serving Watertown leaves at eight in the morning and is back in Syracuse about six at night, covering a haul of 146 miles. It would appear that a drive of 146 miles a day, together with the loading of the merchandise transported, would be too much for the average driver, that difficulty would be experienced in keeping a driver on the job.

Pneumatics Used Exclusively

The general manager of the company informed the writer that the giant pneumatics have solved the driver problem, have made possible greater speed or miles per hour than was possible with the solids, and that the drivers were not so fatigued as when driving a considerably shorter distance with solids. All of the trucks are equipped with the big pneumatics, and the cars comprise five Seldens, two 2½ and three 1½-ton; a 1½-ton Brockaway, a 2-ton White, a 1500-lb. Reo and a converted Cadillac. The last named is utilized as an emergency car.

The trucks pick up approximately 50 per cent of their loads in the wholesale districts, and the balance of the goods is brought to a central point in Syracuse. Routes are compiled the day previous to shipping. As the majority of concerns ship practically on schedule it is a comparatively simple matter to estimate the loads and number of trucks required for a given route. The material carried includes meats, food (not perishables), automobile supplies and parts, electrical goods, dry goods and staple merchandise. Heavy food products, such as sugar, etc., and which are sold on narrow margins, are not transported except in emergency instances.

Meats and the products of the packers form the bulk of the shipments. It is said that with but two exceptions all packers or their branches rely upon the motor transport to haul their goods.

Map, Showing the Radius of Delivery and Including Oswego Where Lake Connections Are Made

These were the original customers of the company. The store door delivery or direct from shipper to consignee appeals to this trade, for not only do the meats arrive in better condition but the haul to the train and delivery on the other end are eliminated. Motor truck delivery permits considerable more leeway in closing time for accepting shipment by truck.

Educate Merchants

Salesmen are employed by the Central N. Y. Motor Transportation Lines to educate and sell the merchants in Syracuse and the cities and towns served. Among the exponents of the service is a woman, who having been identified with a motor transportation company has proven very efficient in selling the service. The rates are slightly less than express and more than the freight, but effort is made **to sell the service** not the rates which, after all, is good merchandising of any commodity. Cards and stickers for shippers are distributed and these carry the instructions to ship by Central N. Y. Motor Transportation lines.

Effort is made to develop return hauls so that the trucks will not return empty and be operated at a loss. There is a certain amount of merchandise and material

One of the Trucks of the Central New York Motor Transport Lines Loading a Consignment

being shipped from the cities served and a special rate is given to shippers having goods to be transported to Syracuse. As a rule the trucks do not make stops to deliver between Syracuse and their terminals, the service being a through or an express service. In this way schedule is maintained.

A record is maintained of the results secured with the pneumatics. Several makes are in the service and the figures of one set of Goodyears is of interest to those who are skeptical as to the cost per mile with the big shoes. A pair of shoes on one of the Seldens ran 15,000 miles, after which they were retreaded, and at the time of this writing they had traveled 4,000 additional miles and appeared to be in excellent condition. Another Goodyear, 36x6, on a 1½-ton Selden, was run until worn to the fabric, and after a blowout caused by a cut, the shoe was repaired, retreaded, and is still on the job. The manager of the company believes in retreading the shoes. His method is to shift the rear shoes to the front, after repairing them, and place new tires on the rear wheels. He informed the writer that in the future he would use oversize tires for he believed that the cost per mile would be still further reduced. He is a booster for pneumatics but being an expert mechanic he resented the idea of adapting the present chassis design to pneumatics. "It is a case of adapting the tires to the truck, not building the trucks for the tires," he said. "The present design is adapted to slow speeds and solid tires and when you increase the speed to that where pneumatics come in you develop trouble." And it is interesting to note that changes are being made in the trucks used by the company, and that the manager said he was going to assemble his trucks in the near future. He has some novel ideas as to construction and design. A repair shop or service station is maintained by the company and it builds its own bodies for its trucks.

Optimistic as to the Future

The writer spent an hour or more discussing motor highway transportation with the manager of the company who is exceedingly optimistic as to the future of the business. He believes that the railroads will gradually drop the short haul business and that a trucking company that can give dependable service will make real money. The trucks come under the common carrier liability, and with good drivers and careful supervision the Central N. Y. Transportation Lines hope to become a factor in transportation in the community it is now serving.

The Motor Truck's Part in the Terminal Congestion Problem

By R. E. FULTON, Vice-President International Motor Company, Manufacturers of Mack Trucks

FREIGHT congestion is, in reality, terminal congestion. The present railroad situation vividly demonstrates that the root of the much discussed railroad inadequacy lies more in the lack of proper terminal facilities than it does in the lack of freight cars. It has further proved that the motor truck, properly used in conjunction with railroad terminals, can relieve terminal congestion and increase the productivity of each unit of the railroad's rolling stock.

Although it is estimated that the railroads of this country now need 500,000 more freight cars, it is obvious that, if this number of cars were put into service under existing terminal conditions, the confusion would only be increased.

Cities have grown and traffic has increased, but the terminals that were constructed in the days of horse-drawn highway transportation facilities have remained practically unchanged, particularly as far as distribution radius is concerned. As a result, the railroads are still attempting to operate on a horse-drawn basis of ultimate distribution and consequently, freight piles up in the yards and the tracks are filled with trains awaiting their turn to be unloaded. Although motor trucks are now being used to a large extent instead of horses, the platform area available for transferring shipments from the freight car to the truck is so confined that it is impossible to avoid congestion.

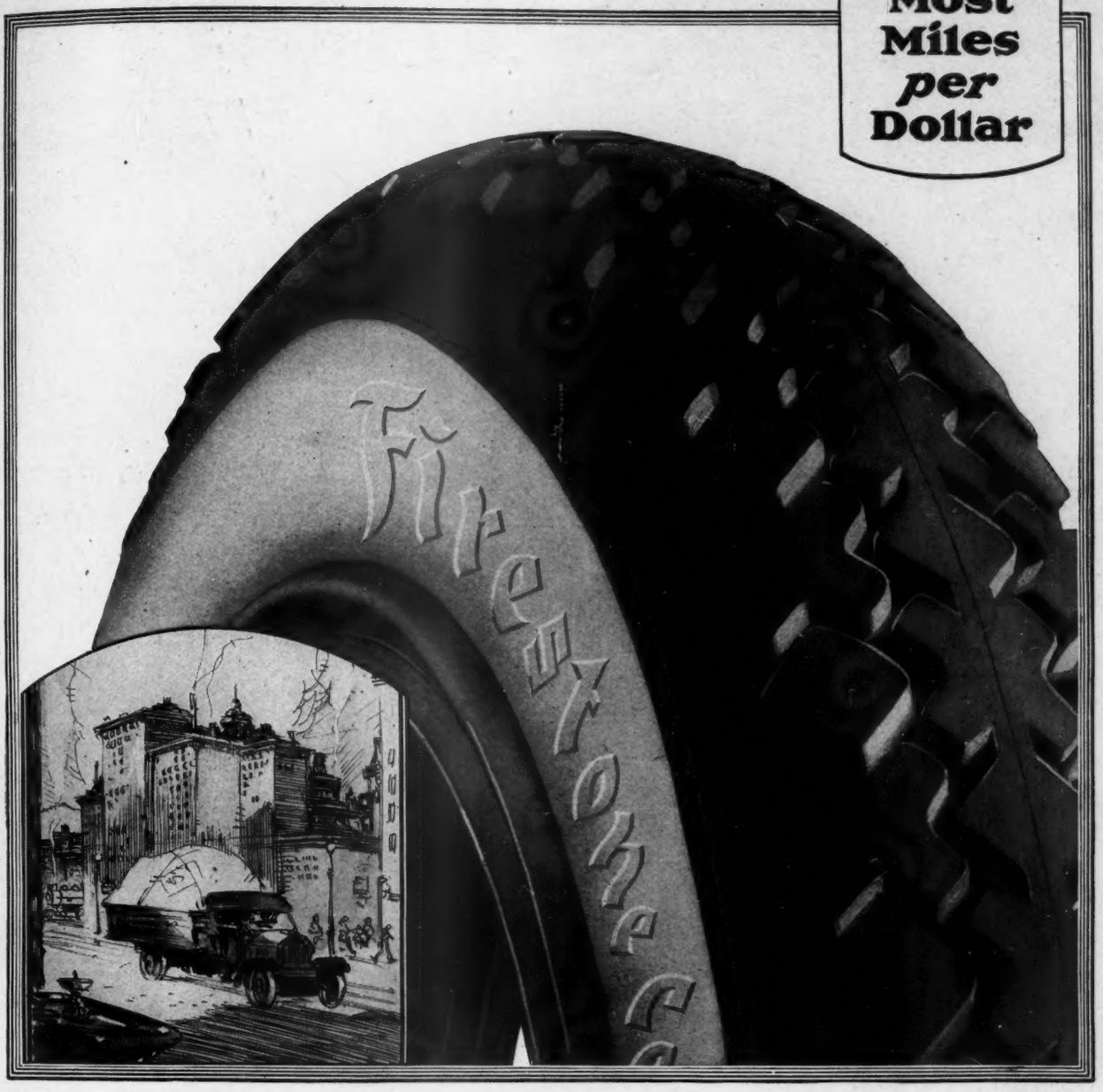
It is a fact that the average freight car travels only about six miles a day, and that this inefficiency can be attributed directly to wasted time through terminal congestion. Considering that we now have over 2,400,000 freight cars in use, it can be seen that every mile per day added to the productivity of this total by increasing terminal efficiency, is the equivalent of four hundred thousand more cars. Thus it is obvious that if a continuous movement of freight cars to and from their terminal points can be obtained, a two-fold advantage will result; first, eliminating the delay and waste incidental to congestions, and second, releasing a vast number of cars for main line traffic.

To say that this can be accomplished by utilizing the motor truck is not a mere prophecy—it is a proven reality. The few railroads that have applied the use of trucks in their limited way to this problem have met with remarkable success and should stand as uncompromising examples to every railroad now affected by terminal congestion. For example, figures compiled by the U. S. Railroad Administration show that in the Big Four yards at Cincinnati, the use of motor trucks with demountable bodies has reduced the time required per ton-mile for transfer shipments from 12 hours and 18 minutes, to less than 3 minutes. This saving of time is accompanied by a reduction of fifty cents per ton-mile on the cost of the transfer shipments. The New Jersey Central Railroad has adopted motor truck service in connection with its Jersey City terminal in a way that indicates immense possibilities for minimizing congestion. This terminal became so congested during the recent general tie-up that it became useless to send loaded freight cars there. So Plainfield, N. J., a city nearby, was made a terminal point and goods are now being transferred there to motor trucks and hauled into Jersey City and other destination points.

This idea of diverting shipments, while not a new one, has up to the present been confined to emergency use. It seems logical, however, that the diverting principle presents the most practicable means for permanently relieving the railroads of terminal congestion. By establishing subterminals at the outskirts of large cities on the various lines of approach, freight loads could be transferred to motor trucks and delivered to the consignees far more rapidly and economically than at present. This method would also relieve street traffic in the congested parts of large cities because (1) the terminals would then be adapted to use the more rapid and flexible moving motor truck instead of horse-drawn equipment, (2) the number of vehicles bringing and receiving goods at terminals would be divided in their operations to different parts of the city, and (3) the large capacity trucks could be utilized for handling carload lots, thus minimizing the number of vehicles required to handle transfers.

The motor truck is now a permanent supplement to the railroads and has proved its capacity to take over the short haul traffic that has developed to be time-wasting and unprofitable business for them. By "feeding" short haul shipments to the main line traffic, it has released thousands of cars for long distance transportation and has done much toward relieving congestion at terminals. But the development of this co-operative relation between the railroad and the motor truck is still in its infant stages. It is but natural to expect that before long the railroad terminals of this country will be reorganized and adapted to obtain the full benefits of the economies and conveniences offered by the motor truck. The sooner we lend our energies to achieving a possibility instead of throwing up our hands in despair and waiting for a prodigious number of cars to spring up from nowhere, the better the transportation interests of the country will be served.

Most Miles *per* Dollar



THE Firestone Giant Cord Tire meets the needs of trucking with exceptional resiliency, wide tractive surface and a dependable tread grip.

On city streets or country roads the Firestone Cord protects the load and the truck, cuts down consumption of gas and oil and gives unusual mileage.

Make haulage safe and economical at increased speed. Adopt Firestone Giant Cords.

FIRESTONE TIRE & RUBBER COMPANY
Firestone Park Akron, Ohio
Branches and Dealers Everywhere

Firestone

New Spring Shackle Easy to Disassemble and Cuts Cost of Manufacture

THE growth of the automotive industry has been so rapid that it is little less than wonderful to contemplate the almost complete standardization of parts that has already taken place. This feature of interchangeable parts, made to a standard, each sure to fit any other unit made to the same specifications, is common to the whole chassis with very few exceptions.

In comparison with the improvements made in most other parts since the beginning of the industry, the spring shackle has apparently been improved less than any other important detail.

It is by no means an uncommon occurrence to snap a spring, and it always means disassembling the shackle. Anyone who has taken apart a shackle when he was forty miles from town, on a dark night, on a strange road, with the rain pouring, is in a position to appreciate any real improvement in the usual construction.

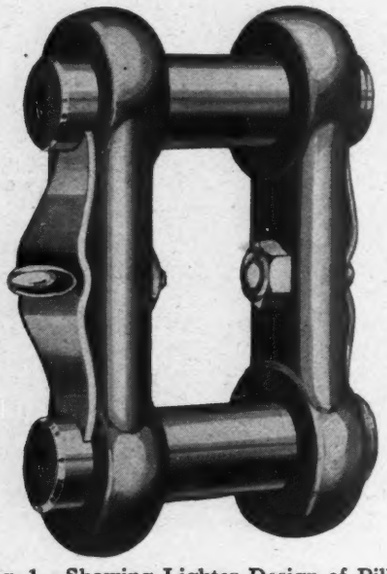


Fig. 1. Showing Lighter Design of Pilkington Spring Shackle

The spring shackle, shown in the cuts herewith, was designed by Robt. G. Pilkington, 1537 East Sixty-fifth St., Chicago, a veteran of the automotive industry, with a view to greater ease of assembling and disassembling and a cheaper method of manufacture. It differs from the old and well-known design in several essential features. The side links are available for any width of spring. Their shape, and the simplicity of the operations to be performed on them, make them a simple manufacturing proposition. However, the links are not essentially different from the old style. The novel features of the shackle are the pins, or shackle bolts, and the means of locking them in place, endwise and against oscillation.

Near each end of the pin is milled a narrow slot or groove. In Fig. 1 the bottom of the slot is an arc of a circle, and in Fig. 2 it is flat. The sheet metal clip lying next to the link is just thick enough to fit closely in the slot, and its ends are hardened. This clip is formed in a flat arch, with a shallow groove to keep the clip holding screw from turning. The length of the clip is just enough less than the distance between the bottoms of the slots in the pins to allow the clip to be rotated on the holding screw when there is no tension applied. When the nut on the holding screw is tightened, the clip is lengthened and forced against the bottoms of the slots with very great pressure, effectually preventing any oscillation of the pins.

In Fig. 2 the shackle is shown with offset links and a shroud. It is obvious that the construction is just as applicable to a straight link and shroud. The object of the shroud is to provide greater strength for the heavier class of cars and for trucks. The flat portion is used to carry the stamped name of the car maker.

The ends of the clip and the ends of the shroud, where they fit the slots in the pins, and the pins themselves, are hardened. To wreck the shackle when in use, it would be necessary to shear out bodily at least two of the ends of the sheet metal parts. This would involve a stress that could not be applied in use.

The ordinary style of shackle bolt has a hexagon head, in which is often incorporated a grease cup. In machining this form of bolt about as much metal is wasted as is used, to say nothing of the time and labor involved in removing it. The new shackle bolt is ground from rough stock, hardened and finish ground, a minimum of metal being removed. The only metal removed by machining is that taken from oil holes and from the slots.

It is not necessary to cut any threads, drill any cotter pin holes, nor furnish any castellated nuts or cotter pins. The pins may be thrown into stock bins indiscriminately without fear of spoiling the threads. When they are being assembled they can be "treated rough," which is what a shackle gets anyway. In case it is necessary to dismount a spring while the car is in use, the loosening of the clip holding screws, shown in Fig. 1, or the cap screws holding the shroud, as in Fig. 2, allows all parts to be instantly freed.

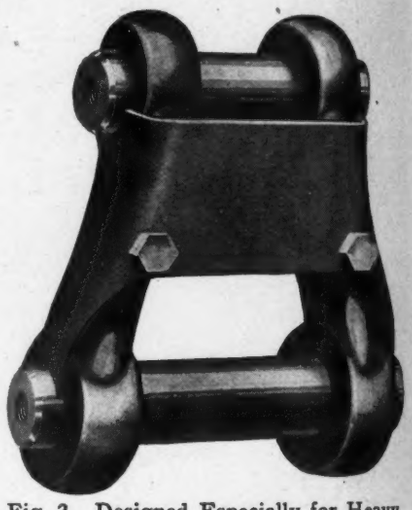


Fig. 2. Designed Especially for Heavy Duty Trucks

In this construction the shroud is held in place by cap screws

The design of this shackle is the result of twenty-one years of experience as an engineer in the automotive industry, and is very broadly protected by patent.

The Members of the Philadelphia Motor Truck Association Immigrated to Kugler's Mohican Country Club, on the Delaware, on June 12, for a General Good Time on Its Annual Outing

Here the members engaged in various games, were entertained by many interesting acts of vaudeville, and the banquet was made enjoyable by the humorous addresses by the speakers, one of which was delivered by Dr. Cattell, Philadelphia's statistician

ROSS STEERING GEARS

Easy Steering Increases Efficiency, Reduces Delivery Costs, Makes Satisfied Owners

The real efficiency of a motor truck depends very largely upon the ease with which it can be handled. This is one of the most vital of all considerations for the man who buys a truck, or for the manufacturer or dealer who sells it. Ease of handling, in turn, depends essentially upon the steering gear with which it is controlled.

Ross Steering Gears, with their enormous bearing surfaces, mean an easier day's work for the driver, and at the same time a bigger return to the employer in greater service from both the truck and the man who drives it. This increased efficiency reduces delivery costs and makes satisfied owners.

In order to insure their customers of the easy steering, the safety and the reliability which Ross Steering Gears guarantee, 171 motor truck manufacturers are now using them as standard equipment. They know that Ross Steering Gears mean contented drivers and satisfied owners.

Write for any further information desired

ROSS GEAR & TOOL COMPANY

760 HEATH STREET, LAFAYETTE, INDIANA, U. S. A.

The Steering Gears that Predominate on Motor Trucks

Cheap Distribution Need of the Hour

Trucks, Tractors and Trailers Meeting the Emergency Need of Highways to Sustain Developing Traffic

THE advent of the tractor and trailer is one indication that the great industrial need always produces the means to fulfill it, said H. Eltinge Breed, former deputy commissioner of the New York State Highway Commission, in an address delivered recently at the annual meeting of the National Highway Traffic Association in New York City.

"There are registered in the country today 35,000 trailers and their percentage of increase in the last two years has been over 100 per cent. Much as we need distribution, we need, even more, economy in distribution. It is appalling to realize that we, as consumers, pay from three to ten times the actual cost of the finished article, be it manufactured or natural product. Whatever effects a saving in cost to the consumer is a national boon. Motor power for short-haul freight does effect such a saving."

"Trailers," continued Mr. Breed, "make it possible for one tractor and one driver to do the work of three. Together with the motor truck they have met the industrial need. More and more they are becoming to the great cities the strongest assurance of a sufficient food supply."

Highways Impede Economic Transportation

But motor transportation suffers a serious check in the uncertainty of highway design. This spring improved roads have gone to pieces as they never have before. Some people say the damage is due to the hard winter. This Mr. Breed said he does not believe, maintaining that the roads are organically wrong because they are not designed for the loads they must bear. Unless they can sustain the necessary traffic they do not fulfill their function, but hinder instead of help distribution. The savings effected by motor transportation more than offset the cost of roads that are essential to this transportation.

Adequate design of highways for tractor and trailer, he said, means immediate provision for three lines of traffic near all large cities and on all truck routes, with possibility of an added ten feet longitudinally for a fourth line. Turns must be widened because of the greater length of tractor and trailer, and curves must be superelevated so that the vehicles will keep their own line of traffic. Special attention must be given to reducing grades, because of the increasing cost of fuel. The saving in fuel on heavily traveled main roads often compensates in a year or two for whatever additional cost is involved in reducing grades.

Tractors and trailers are less hard in impact upon pavement than heavily loaded trucks, because of the distribution of load over six or eight wheels and their slower movement. They do not require any greater strength of foundation or better type of surfacing than should be provided for regular heavy traffic, but all heavy traffic requires an adequate foundation and a durable type of pavement; a semi-durable pavement for heavy traffic is sheer waste.

"I became more and more convinced," concluded Mr. Breed, "that the final success of road building depends upon the intelligence of the public, which must not only demand good roads but must know enough about what constitutes good roads to act as a spur to the conscience of engineers and contractors. Good roads require an alert, intelligent public, engineers with vision, competent contractors and the training in highway work that some universities are now giving. The urgency of the need itself will gradually produce highways that will be adequate to the demands of tractor and trailer traffic."

Drastic Legislation and Unethical Business Methods Cannot Stop Progress of Industry

Laws militating against the use of trucks of heavy tonnage except upon payment of heavy license fees, or even the opinions of learned judges that motor buses are a public nuisance, cannot stop the progress of the truck industry. It only proves the shortsightedness of public officials, says George D. Wilcox, director of sales and advertising, of the Commerce Motor Car Co., Detroit, Mich.

Motorized transportation is a public necessity that the government during the war advanced ten years, and because of their experience with government ownership of railroads, gave the industry a bigger boost than five years of expensive propaganda work could accomplish.

No public utterances can stop the progress of the truck industry, because it is an essential belonging to one of three most important groups of the laws of business, natural resources, natural growth and transportation. It is the one element of the branches of transportation that comes to the public's rescue in strikes, in its efforts to bring down the high cost of living, and it will continue to be a factor in the business progress of the country because it cuts down time and does its work efficiently.

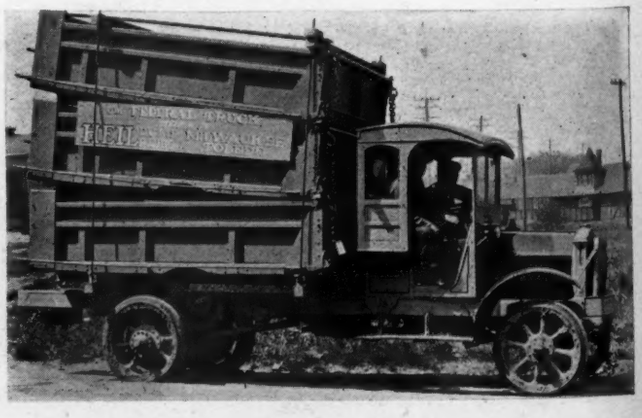
Its progress can only be retarded by non-construction of highways and even the worst enemy of good highways cannot stop the public demand that the government, every state and highway agency get busy and spend the appropriations that have been made for good highways. Even with poor highways the pneumatic cord tire equipped truck is able to make its scheduled trips.

As soon as this industry divorces itself in every respect from the passenger car industry, and as an organization starts after the plums in the business, that their good business judgment tells them is correct, then the truck industry will even outstrip the lead that the passenger car industry has on it.

It is a business that is in its infancy and one that will some day be a factor, in business and financial circles, that will astonish the world. Today it is in the hands of conservative business men; in the few instances that it is handled by radicals, even they are riding on the pinnacle of success. As to it being a solid foundation for the radicals, only the future can tell.

Distance and Top-Heavy Loads Don't Worry This Outfit.

The Sturtevant-Jones Co., Toledo, Ohio, drove a Federal truck through to Milwaukee recently, and returned with three Heil Combination Dump Bodies. Iron bars and braces were required to keep the load which was top heavy, from shifting on the long trip back to Toledo. The truck left Toledo on a Friday and arrived in Milwaukee on the following Monday. The return trip was also made in good time.



SIVYER CASTINGS

The Sivyer Service of providing Electric Steel Castings has for its objects the decrease of machining costs and the increase of wearing quality and life. Both are attained by methods which result from long experience and begin with the design of the casting itself. When we find that a casting we are asked to furnish is of a design not consistent with good foundry practice, we study its function in the completed unit and offer the necessary suggestions to make it a really practicable casting job without affecting in any way its function and efficiency.

Sivyer Steel rear axle pad and radius rod block used on Service Motor Trucks

Secondly: Sivyer Service analyzes the functions of the casting and specifies the proper composition steel for the job; long experience with carbon and alloy steels has enabled us to reduce costs and increase quality remarkably for many different industries.

Thirdly: Sivyer Service makes a careful study of the pattern and molding problems involved, for improper gating and insufficient risers are often the greatest wasters of machining labor and metal.

Fourthly: Sivyer Service analyzes carefully the proper annealing methods to be used and controls their proper application through unfailingly efficient equipment and men. In short, the Sivyer Service supervises every step necessary to secure unusually and unfailingly good castings of electric steel. It never relies on one factor alone, relies very little even on the natural freedom of electric steel from occluded gases and on its commonly recognized merits in resisting crystallization. It also depends but little on the inherent scientific accuracy of the electric furnace process. From casting-design to sand-blasting and tumbling, the fundamental superiority of Sivyer Steel is due to its men and metal. Their value is best proved by the fact that, although the production of steel castings is generally looked upon as a local one, the Sivyer market is national.

FOR parts having to oppose the continuous jolts and heavy shocks received in everyday duty, an increasing number of manufacturers in different sections of the country are coming to the use of a superior metal—Sivyer Electric Steel. The Service Motor Truck Co. uses Sivyer Castings for the rear axle pad and radius rod block because of their uniformly flawless quality and because of the superior resistance to crystallization and wear found in Sivyer Electric Steel. Attached to the rear axle, this part stands unfailingly the repeated jarring and severe driving strains to which it is subjected. Thus are Sivyer Castings bettering the performance and lengthening the life of America's leading trucks.

SIVYER STEEL

SIVYER STEEL CASTING COMPANY, MILWAUKEE

Will Pneumatic Tires Replace Solids?

By P. D. COLLINS, Manufacturers' Sales Department, Goodyear Tire & Rubber Company, Akron, Ohio

IN view of the very rapid increase in the number of motor trucks now being operated on pneumatic equipment, and of the widespread publicity being given to the performance of pneumatic tired jobs, a considerable discussion seems to have arisen as to whether or not pneumatics will eventually replace solids.

The writer was particularly interested in the articles by Mr. Hugo Hoffstaedter, of the Polak Tire & Rubber Co., and in the previous article by Mr. J. N. Gunn, of the United States Tire Co., to which Mr. Hoffstaedter's article refers.

In each of these articles the comparative merits of the solid and pneumatic types of equipment were very impartially discussed and yet it seems evident that it would be possible for one unfamiliar with the whole proposition to arrive at erroneous conclusions.

Mr. Hoffstaedter for example points out very truly that only a relatively small percentage of motor trucks (exc uding light delivery wagons) are at present pneumatic equipped. However, it must, of course, be remembered that it has only been about one year that truck manufacturers have been producing models on which pneumatic equipment could be obtained.

Production statistics for the calendar year to date indicate that the percentage of trucks on pneumatic tires is increasing rather rapidly. Presumably there will be built during the present year somewhere in the neighborhood of 375,000 motor trucks. At the present rate of production this total number will be divided as to tire equipment somewhat as follows:

Light delivery trucks on passenger car size pneumatics (35 x 5) and smaller, 140,000; trucks on solid tires, 135,000; trucks on big pneumatics (36 x 6) and over, 100,000. When it is figured that the big production of Ford trucks is included and it is remembered that the tire equipment on these jobs places this number entirely in the first two classes, the present popularity of pneumatic equipment on other makes of trucks will be seen as relatively greater.

As Mr. Hoffstaedter pointed out some of the largest fleet operators, such as big oil companies might be expected to have analyzed the comparative merits of solids and pneumatics and their findings should throw some light on the subject.

The writer has had an opportunity to study the operating records of one large oil concern. These records were kept on National Standard Truck Cost System forms, and show in de ail the comparative costs of operation for a six-month period —of two trucks, one on solids and one on pneumatics.

These trucks were put into service at the same time and operated under same conditions over the same or similar routes. Some of the outstanding facts shown by this test are quoted here.

As a result it is understood that this oil company has decided to specify all pneumatic tired trucks for this type of work in future. Such concerns as the Texas Oil, Tidewater Oil, Standard Oils of Indiana, Ohio, New York, etc., have shown a marked tendency to order out tank trucks on pneumatic equipment.

In the cost records referred to above and in other accurate records which I have had an opportunity to study, it is apparent that one of the reasons why pneumatics have shown considerable savings over solids is because the pneumatic equipped truck almost invariably covered more mileage each day. The outstanding result of this would naturally be to reduce the cost per mile of driver hire, which in turn would materially affect the cost per mile or the cost per ton mile of truck operation.

Item	Truck No. 134 Solid Tires Rear Pneumatic Tires Front	Truck No. 135 Pneumatic Tires on All Four Wheels	Difference in Favor of All-Pneumatic Equipment
Number of days operated....	129.5	129.5	
Delivery or pickup stops.....	4,183	5,822	39% More customers served
Total units (pounds carried)	874,791	989,065	13% More product hauled
Miles traveled	4,476	6,414	43% More distance covered
Gallons of gasoline	1,125	1,110	45% Less fuel per mile
Pints of cylinder oil.....	605	494	76% Less cylinder oil per mile
Drivers' and helpers' wages..	$1,375.15	$1,512.82	23% Less labor cost per mile

But further study of the reports does not show that this increased daily mileage was due to increasing the maximum truck speed. Both solids and pneumatic tired jobs have been equipped with governors which automatically held the motor r.p.m. to a conservative figure. The principal gain for the pneumatic comes apparently from the increase in minimum speed. In other words, the superior cushioning and traction of the pneumatics makes it possible to operate the truck faster over the rough places and down hills so that the average speed is considerably greater.

An interesting investigation has recently been completed as to the possibilities of operating trucks successfully on farms. Among the results of this investigation it was disclosed that of farmers who now own trucks approximately 70 per cent. would specify pneumatic equipment if they were to buy a new one. Of farmers who do not own trucks 50 per cent. would specify pneumatics.

Of those who favored pneumatics 45 per cent. gave the first reason as better cushioning, 44 per cent. better traction and only 11 per cent. mentioned greater speed.

A brief study of truck operation in any city today will, I believe, prove that solid tire trucks are being operated at very nearly as high maximum speed as are those on pneumatics. But the pneumatic tired jobs generally get over more territory per day because their minimum speeds and so their average speeds are greater.

Truck engineers have as a rule been inclined to believe that the general use of pneumatics will make necessary some rather radical changes in truck design. Quite probably this is true.

There have in the past ten years been some rather radical changes in automobile design. But there is available at present a very abundant amount of data to indicate that operators of motor trucks as now built can, in a variety of different types of hauling, operate their trucks on pneumatics more advantageously than they can on solids.

There is plenty of evidence that in other types of hauling solids are preferable.

Probably as Mr. Hoffstaedter pointed out in deciding on tire equipment, truck operators will find it necessary to make a careful analysis of their hauling requirements. If cushioning is desirable, or efficient traction, or increased radius of daily operation it is quite possible that the use of pneumatics will effect sufficient savings to more than compensate for their higher initial cost.

For slow, heavy haulage over short distances, probably solids will continue to prove cheaper for some time to come. For general delivery, highway transportation, rural express and passenger hauling pneumatics seem to be rapidly coming into favor.

For farm trucks pneumatic equipment is generally necessary and since the farmers are rapidly learning that pneumatic tired trucks are a practical farm tool and an efficient ally in saving time and labor it is generally conceded that the farms of the country will represent the biggest individual fie'd for new truck sales. So as more and more trucks are built for this market probably an increasingly large number of them will be pneumatic equipped.

It seems to be the consensus of opinion among truck manufacturers and dealers that both types of tires will continue in use indefinitely. But in view of the greatly increased number of uses for which pneumatic tired trucks are proving themselves practical, most of these manufacturers seem inclined to believe that the percentage of trucks on pneumatics will continue to increase rapidly.

And as a result most of them are contemplating gradual development in truck design.

The Atterbury Franchise as an Investment

Eleven years of satisfactory service to owners, and satisfactory profits to dealers have resulted in the deep-rooted demand which made necessary this new enlarged Atterbury plant.

SUPPOSE you had secured the Atterbury agency eleven years ago—in a way you would have been taking a chance. But think how your original investment of time and money would have grown in those eleven years of satisfactory service!

The Atterbury franchise today fills all these requirements of a sound investment:

1. **Established reputation.**
2. **Excellence of product.**
3. **Records of profits paid to other dealers.**

It will pay you to investigate.

Atterbury Motor Car Company

Buffalo, N. Y.

ATTERBURY

MOTOR TRUCKS OF MAXIMUM SERVICE

The Three Delivering Essentials: Speed, Constant Service and Economy

By FRANK LUNT, Superintendent, The Times Square Supply Company, Chicago

THE delivery and haulage of automobile parts and accessories, is, in a general way, practically identical with any other delivery proposition. Speed, constant service and economy are the essentials demanded, for they are needed if customers are to be kept satisfied.

The Times Square Supply Co., Chicago, Ill., realizing the importance of meeting these requirements in every way, has long since relegated its old-time horse-drawn vehicle into the background, substituting in their place a fleet of Selden trucks. A 1½-ton Selden is engaged in hauling shipments to and from the freight and express depots. Such service demands speed or deliveries to customers would be delayed, and a delay of a few minutes in reaching the depot may mean the loss of a day in the forwarding of a part that a customer may urgently need.

Before using trucks, the horse-drawn vehicles were rented to make these deliveries and pick-ups but this was not satisfactory, as too much time was required to make a trip. A delivery or a pick-up at one of the more distant freight houses would take a team exactly half a day. Furthermore, with the teams trips could not be made to all the required stations as they were too slow. As a result, shipments were often delayed two or three days while waiting for a team to make a schedule trip. With the introduction of trucks into the delivery system, work that formerly required two teams, is now accomplished by one truck. This one truck not only does it better, but enables all deliveries to be made promptly and regularly.

This prompt and regular daily service is essential for rapid and smooth movement, and as a result the customers receive their orders promptly, thereby reducing former complaints to a minimum. Satisfied customers always mean more customers, and more orders.

The 1½-ton truck, now in operation was purchased in March, 1919, and it has been in service every business day since, having had no interruptions, nor time off for repairs, as minor adjustments were made while waiting for loads.

The figures below are based on the National Standard Systems; depreciation being based upon a life of 60,000 mi., and tire costs being estimated on a life of 12,000 mi., although the original set is still on the truck, and evidently good for several more months of service.

Up to the present time nothing has been expended for repairs, nor does the truck need overhauling, despite its present 12,000 mi. Nevertheless, 1c per mile has been allowed for figuring our daily costs for future repair and overhauling.

Average Costs

Cost per day (including driver)	$10.53
Cost per mile	.27
Total cost for 1 year	3,212.09

Operation

Days operated	305
Miles traveled	11,895
Miles per day	39
Miles per gallon of gasoline	7.8
Miles per gallon of oil	390

Itemized Costs

Driver Cost per day (included above	$5.03
Depreciation per mile	.032
Maintenance and repair, total actual	.00
Maintenance and repair, per mile actual	.00
Maintenance and repair, per mile estimated	.01
Tire cost per mile, estimated	.024

This daily cost of $10.53 for covering 39 mi., averages 27c per mi. and includes driver, depreciation, interest, garage, insurance and other operating costs; in fact, every cost item chargeable to the motor

If teams were rented for this work, at least two teams would be necessary because of the bulk of the shipments—a daily cost of approximately $30 or more. On this basis the Selden saves this company $19.47 per day—$5,938 yearly—and in addition permits of more prompt and regular deliveries.

Protests Federal Bank Ruling

The N. A. C. C. in a general bulletin to its members says: "We wired the Federal Reserve District Bank of Kansas City protesting a ruling that automobile paper would not be acceptable for rediscount. In a statement credited to Carroll A. Worthington, assistant governor of the bank, it is said that the passenger car industry is using an enormous amount of money and man power that are urgently needed for essentials; that this tends to increase wages by withdrawal of man power from other essential production; that in Kansas City alone there are 40,000 automobiles, of which 30,000 are used largely for pleasure at an annual maintenance of perhaps $30,000,000. As the bank cannot distinguish between paper covering automobiles sold for pleasure and those sold for utilitarian purposes they propose to restrict credit on all except paper based on trucks exclusively.

The action of the Kansas City bank is local and not general, according to Harry G. Moock, general manager of the N. A. D. A., who says it is the result of heavy demands for cash for spring planting.

One of the leading St. Louis dealers, whose loans amount to $250,000 a year, asked his own banker what would be his credit course for the year, and he was assured that credit would be as liberally extended to him this year, as last year.

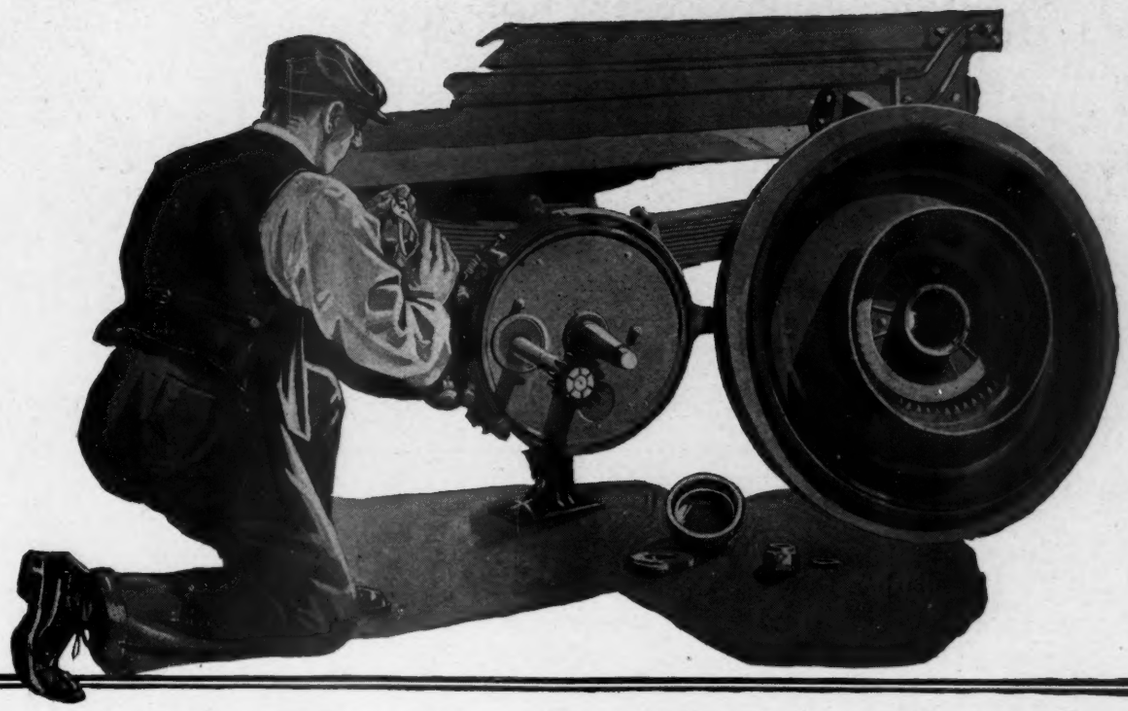
$16,000,000 for Enlarging Packard Plant

Although the Packard Motor Car Co. has buildings in Detroit covering ground one mile long, and 1000 feet wide, it will spend over $16,000,000 the current year in factory additions and expansions. Truck shop extensions will take $2,000,000, and provide a total of 400,000 sq. ft. for machining and assembling operations. The present 10,000 employees will be increased to 15,000 as soon as the new buildings have been completed.

Congressman Knutson, of Minnesota, introduced a joint resolution asking an appropriation of $250,000 for experimentation in substitutes for gasoline by the Bureau of Chemistry.

American Indians Use 20th Century Transport

From the simple transportation devices of the aborigines to the twentieth century motor bus is a far cry. In fact, it would cover the whole period of evolution in methods of traveling humans and their freight. Here are seen descendants of the first Americans enjoying the convenience, comfort and luxury of travel as realized by the internal combustion engine. This good-looking company of boys and girls belong to the United States Indian School at Mount Pleasant, Mich., where Transport trucks are made. All of them are of American Indian parentage and many of them are full-blooded scions of the most famous tribes. The Transport motor bus in and around which they are grouped was furnished the school by the Department of the Interior in September, 1919. Superintendent R. A. Cochran says it has been in constant use either as a bus for conveying students and employees, or for general hauling purposes with a freight body.



SIMPLICITY

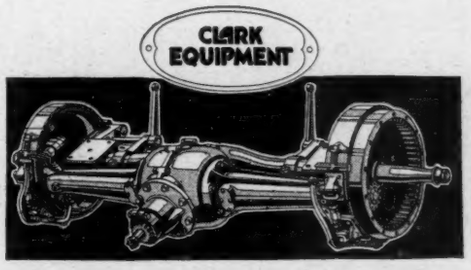
HIGH EFFICIENCY at low cost—all parts easily replaced by any repairman, without loss of time.

The simple application of correct engineering principles in the design and construction of CLARK AXLES provides motor trucks with greater operating economy and longer life.

Clark Steel Disc Wheels make good motor trucks better

Write for descriptive booklets on CLARK AXLES and CLARK STEEL DISC WHEELS.

CLARK EQUIPMENT COMPANY
BUCHANAN MICHIGAN



CLARK AXLES

Taken From Current House Organs

The H. C. of L.

There are approximately 15,000 miles of canals and inland waterways, 350,000 miles of railways, and 2,000,000 miles of highways.

These are the means upon which we must depend for the distribution of our goods, and in particular of our foodstuffs. Food prices in large measure determine living costs and living costs in turn advance all other costs.

Yet transportation does much to limit the farmer's ability to produce, and transportation and distribution are responsible for the difference between the price the farmer receives and the price the city worker pays.

Th waterways cannot be extended to afford substantial relief. The railways, because of fixed lines and terminals, cannot provide complete and direct transportation between producer and consumer.

So for the problems of peace, as for the problems of war, the highways offer the only additional means of communication and transportation.

The construction of new roads and the improvement of old ones is one important step towards cutting food costs. The full utilization of the highways by producer and consumer is another step—and this means more motor trucks.—*Reo Truck News*, Reo Motor Car Co., Lansing, Mich.

The Mental Attitude

All business is to a great degree a matter of the mind. It is the state of mind which sends the salesman out with courage or fear in tackling his hard problems. It is the state of mind which will be the measure of our success in tackling our hard national problems of today and solving them. State of mind can create panics or prevent them. The mental attitude used to make national election years poor business years and it was finally proper mental attitude which corrected this.

Today there appears to be a consistent effort in reliable business and financial circles to bring men to a right mental attitude toward the problems which confront us. Those who are in any way connected with the motor truck industry can be a positive force in the stabilizing process through which we must now pass in changing the abnormal into a normal condition.

The demand for trucks will undoubtedly not lessen materially during the present year, but financial conditions will limit the ability of purchasers to take deliveries. The dealer who can most successfully pass through such a period is the one who is conservative and who is not taking undue risks in making time sales. The motor truck is one of the greatest economic factors today and its sale should be conducted on a sound basis.

The industry should not become panicky. Everyone in it should adopt a sound mental attitude based on the belief that American resources plus such an attitude will keep business stabilized while passing through this transition. Let us recognize how vital transportation is, how necessary it is, irrespective of general business conditions. Motor trucking is a link in the transportation system on which all transportation now depends. During the period of transition from abnormal to normal business conditions, can you think of an industry more basic, more vital, than the motor truck industry with which you would like to be connected during that period?

This is no attempt to say that the change is here or about here. Its only mission is to point the way to the mental attitude which necessarily must affect all our activities. Its purpose is to encourage greater thought on motor truck selling and particularly to the financing of the sale.—*Acme Angles*, Acme Motor Truck Co., Cadillac, Mich.

Genius

Genius is only the power of making continuous efforts. The line between failure and success is so fine that we scarcely know when we pass it—so fine that we are often on the line and do not know it. How many a man has thrown up his hands at a time when a little more effort, a little more patience, would have achieved success. As the tide goes clear out, so it must come clear in. In business, sometimes, prospects may seem darkest when really they are on the turn. A little more persistence, a little more effort, and what seemed hopeless failure may turn to glorious success. There is no failure except in no longer trying. There is no defeat except from within, no really insurmountable barrier save our own inherent weakness of purpose.—*Floating Power Plant News*, U. S. Motor Truck Co., Cincinnati, O.

We need laws that will guarantee to every so-called laboring man, liberal compensation for the work he performs, a compensation which will enable him to support his family in comfort, educate his children, own his home, lay by for the rainy day and in every way live as a law abiding, self-respecting American citizen should live; but, as the so-called capitalist should be restricted with reference to the taking of excess profits, so also should the so-called laboring man, be restricted from demanding an unfair price for his labor.—*The Four Runner*, Kalamazoo Motors Corp., Kal., Mich.

Barges Carry Four Hundred and Ninety Cars Up Ohio

Barges carrying 490 passenger cars were recently taken up the Ohio river from St. Louis to Cincinnati. The great load was towed out of St. Louis on a Sunday morning, and reached Cincinnati the next day. The same steamer will take a shipment of 400 cars from Cincinnati for a return trip to Memphis, and return to St. Louis for another consignment.

The Faultfinder

What an unhappy lot is that of the faultfinder. Nothing can please him! He takes delight in growling and grumbling over everything he meets. Even if a thing is good, he complains because it is not better.

Humanity has no bright side for this grumbler. It looks black, dreary, and hopeless to him.

He overlooks the virtues of an individual and holds up a single fault to judge his character from.

He denounces a party as corrupt because a few rascals in it disgrace themselves by unworthy acts.

The Church is false because a few hypocrites manage to find shelter within it.

The world is on the high road to destruction, and everything indicates the hopeless depravity of man.

The faultfinder gains nothing for himself nor does he add anything to the progress or the happiness of the world.

A single hopeful heart is worth a regiment of these faultfinders.

Humanity has its bright side—beautiful and attractive to those who seek it.

The world is alive with public and private virtue, and we should be ready at all times to encourage the element of happiness. — *Republic Radio*, Republic Truck Corp., Alma, Mich.

Lubrication

Lubrication!

Can one repeat too often just how very important this question is for owners of motor trucks?

As between starting on a day's work with too little gasoline or too little oil, it is far more profitable to begin with too little gasoline.

Why?

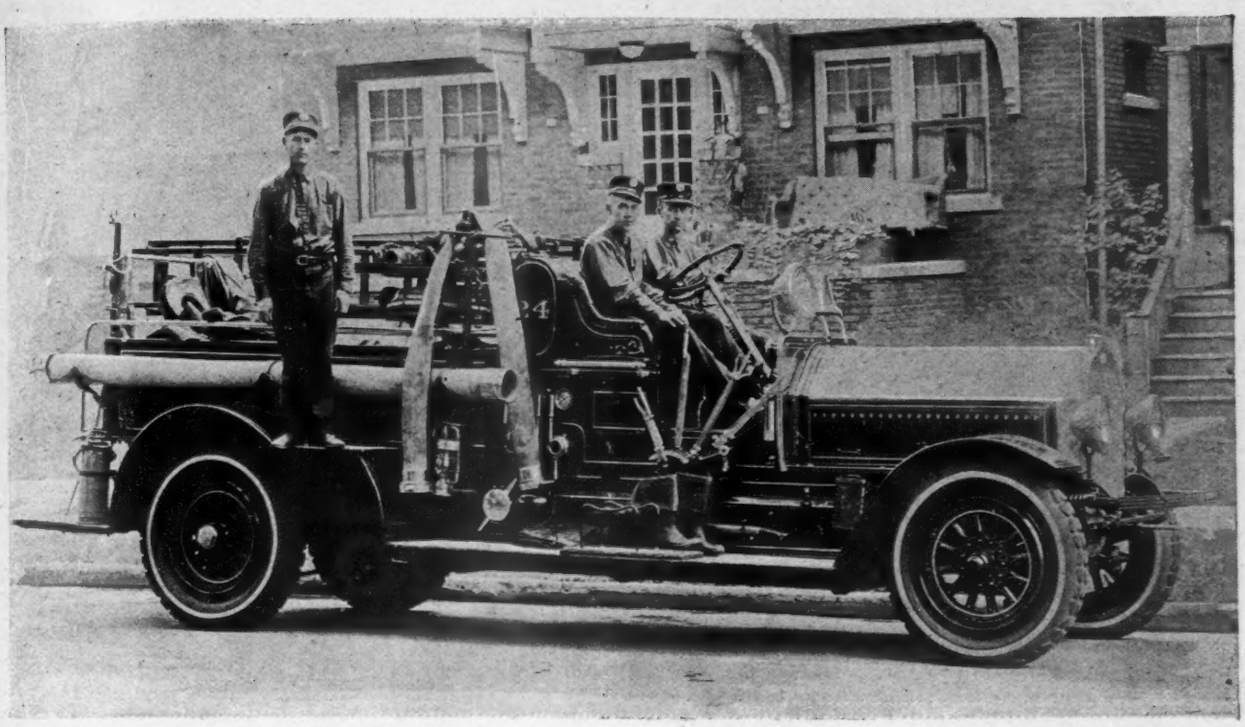
If the gasoline gives out, the only damage is the loss of time incidental to obtaining a fresh supply.

But should the oil not be present in sufficient quantities it will mean that a very valuable motor truck may be ruined, or at best, so affected as to cost many dollars to replace the parts destroyed by the lack of adequate lubrication.

Keep your motor truck properly lubricated. It is well worth your time. Your motor truck, not even as good a motor truck as the Wichita, will not operate satisfactorily or economically unless it is fed oil at regular intervals. — *Witchitank*, Wichita Motors Co., Wichita Falls, Tex.

Motor trucks must have an established capacity. Who is best qualified for establishing this capacity, the engineer designing the truck, the user desirous of hauling all he can, or the salesman anxious to make a sale?

Changing the title of a salesman to "Transportation Expert" does not necessarily make him more competent to sell trucks than before, nor does it make him more scrupulous in the arguments he uses in selling the truck.—*Service*, Service Motor Truck Co., Wabash, Ind.



Seagrave Apparatus
Detroit Fire Department

Power and Speed—

Plus Greater Traction

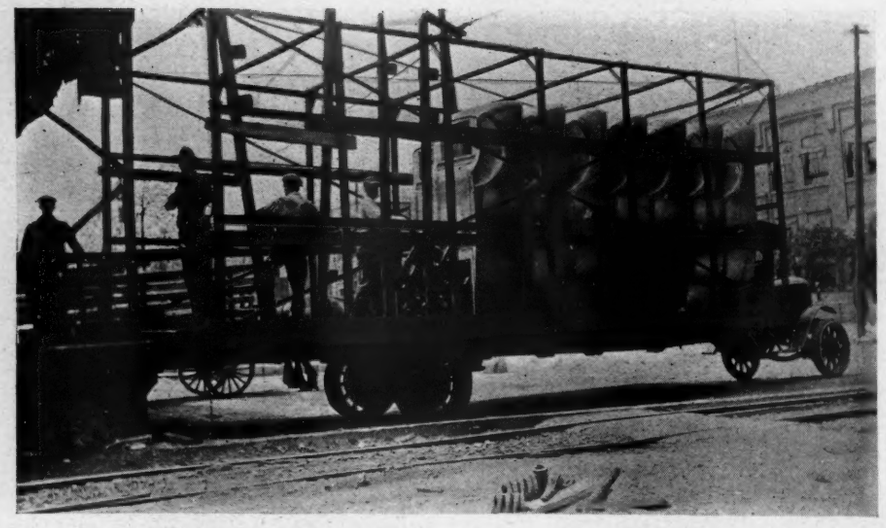
Notable among other municipalities benefiting by UNITED STATES PNEUMATIC TRUCK TIRE Service—Detroit's busy units stand to a man for progressive fire-fighting methods and highly perfected apparatus.

Detroit demanded fast-moving apparatus that would reduce fire loss to a minimum, and well-known truck manufacturers supplied the trucks.

Then municipal heads and truck manufacturers made experiments and demanded a tire with exceptional tractive properties, and 'NOBBY CORD' stood first choice by test.

Ask the chief how 'NOBBY CORDS' further the efficiency of a strenuous day's work, and hear "first hand" the proof of 'NOBBY CORD' effectiveness.

United States Pneumatic Truck Tires Have More Traction



As Many as Twenty-Four Bodies Hauled by This Truck Through City Streets Daily

Ship-by-truck advocates might draw some good ideas as to transportation possibilities of trucks from those used by the Buick Co., Flint, Mich., for hauling bodies. These are genuine leviathans and no other known truck has them outshadowed. This truck is 32 ft. long and has a wheelbase of 384 in. It has a capacity of 24 bodies, 12 in each row. The average Buick body weighs 400 lbs., thus giving a load possibility of 9,600 lbs. These trucks operate from the body plant to the various assembly plants, the haul in some instances being over a half-mile. Most of this distance, of course, is over paved streets, yet streets which enjoy much traffic. And they do the work efficiently and without accident. Speed is quite essential, and even with the great load the trucks do their part in keeping up the present production of 750 cars a day.

This Trailer Employed by the Arrow Motor Line, Chicago, Illinois, Has Increased the Capacity of the Truck Three Times.

It costs approximately 15 to 17 per cent more. Two and a half tons each way, which makes an income of $40, was the former average over one complete cycle of the Arrow route. This company is now averaging 5 tons each way. The semi-trailer is a highway model H-5, drawn by a two-ton truck.

Shipment of Pea Seed Made by a G. M. C. Truck, Equipped With a Heil Body During the Railroad Strike.

This load of Pea Seed, which is about to leave the freight depot, is valued at $12,000. It was imperative that this shipment be made from Milwaukee to Janesville immediately. The combination body was especially adapted for this kind of work and is fitted with a Hydro Hoist. This body and hoist are manufactured by The Heil Co., 1142 Montana Ave., Milwaukee, Wis.

New Transcontinental Record by Motor Truck

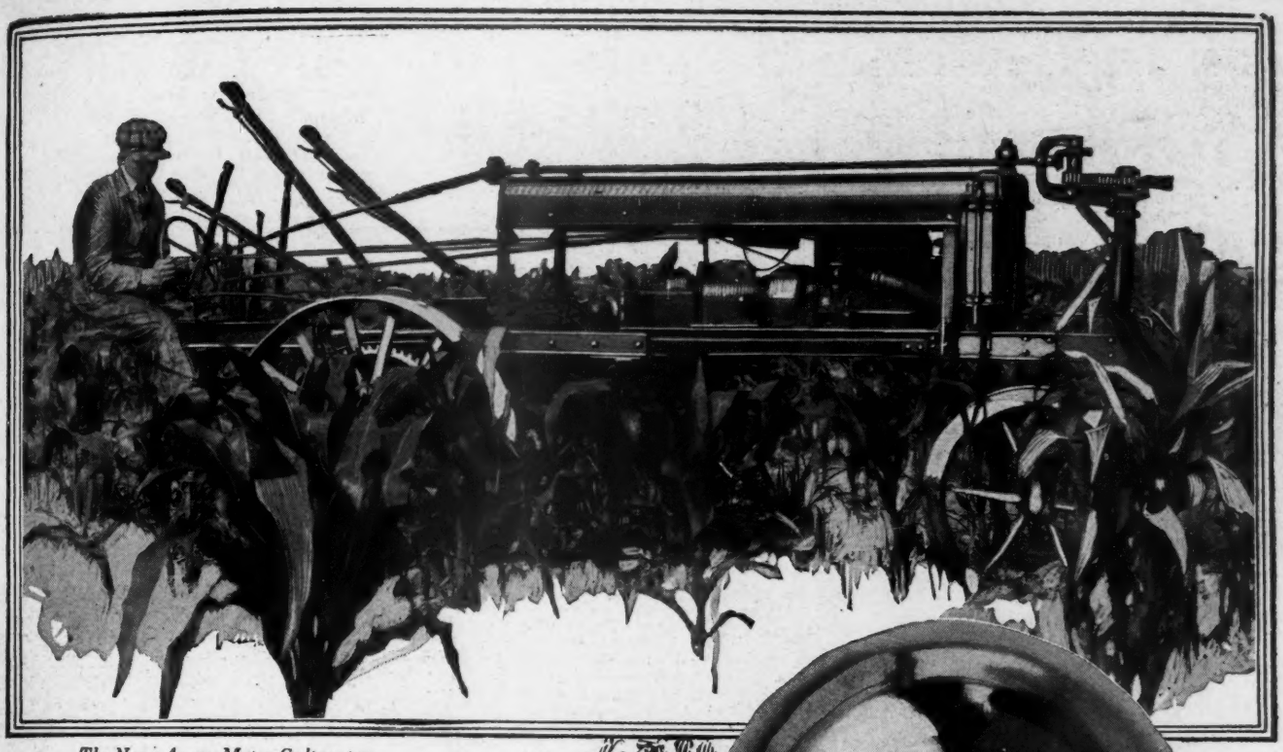
A new world's record for the 3500 mile transcontinental trip from Los Angeles to New York has been made by a pneumatically equipped motor truck of The Goodyear Tire & Rubber Co. The new record is 13 days and five hours, making an average daily run of 250 miles. The previous record of 17 days and three hours was established in 1913 by a light weight Maxwell truck.

The big freighter traveled 2000 miles over the Santa Fe route to Kansas City in eight days and 13 hours, despite 32 hours lost because of bad roads and detours in New Mexico.

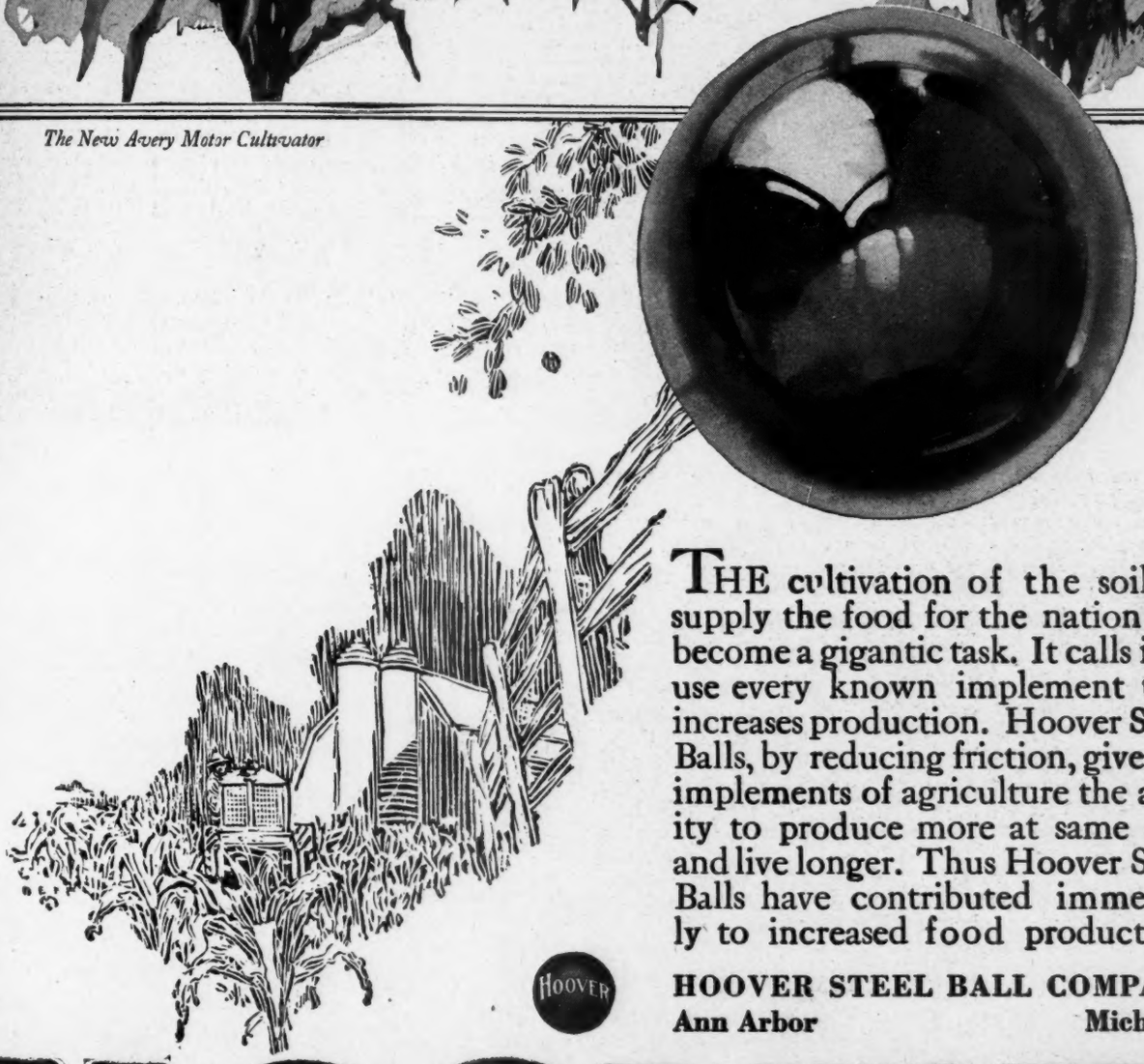
Just 12 days after leaving Los Angeles, the big truck rolled into the factories at Akron—a distance of 2900 miles. The drivers relieved each other every six hours, one sleeping in a comfortable cab behind the driver's seat, while the other maintained the schedule.

The truck made its first transcontinental run from Boston to San Francisco in September, 1918—3700 miles in 21 days. The same truck traveled with an army transport train over the Lincoln Highway in 1919, and since then has been giving demonstrations along the Pacific coast.

Iowa, a great potential market for trucks, will spend more than twenty and a quarter millions upon good roads.



The New Avery Motor Cultivator



THE cultivation of the soil to supply the food for the nation has become a gigantic task. It calls into use every known implement that increases production. Hoover Steel Balls, by reducing friction, give the implements of agriculture the ability to produce more at same cost and live longer. Thus Hoover Steel Balls have contributed immensely to increased food production.

HOOVER STEEL BALL COMPANY
Ann Arbor Michigan

HOOVER
STEEL BALLS

M. T. M. A. Finds Banks Are Not Discriminating Against Motor Truck Paper

THE following bulletin was recently sent to all members of the Motor Truck Manufacturers' Association. It shows specifically that the banks are taking a most favorable attitude towards discounting motor truck paper.

To Members of M. T. M. A.:

In view of the following facts:

That Banks in certain sections of the country are refusing to discount Motor Truck paper;

That these Banks are giving as their reasons for thus refusing credit certain supposed rulings of the Federal Reserve Board;

That Governors of certain Federal Reserve Districts, as, for instance, Governor Wellborn of Atlanta, Ga., have taken in public, and otherwise, a position most favorable to the Motor Truck Industry;

And whereas, we believed this discrimination in favor of the Motor Truck to be economically sound, fair to the Industry, and just, from the viewpoint of our national welfare;

And whereas, we were convinced that the position taken by the Federal Reserve Board, with regard to extension of credit at the present time, is so clearly stated, however, that no fair minded man could find reason therein to do other than extend all reasonable credit to purchasers of Motor Trucks;

Therefore, I went to Washington, had a conference with Governor Harding, and through other sources, traced the causes of the Credit Problem, now confronting Motor Truck Manufacturers.

The position which the Federal Reserve Board has taken is most satisfactory to the Motor Truck Industry. It is not discriminating for or against any Industry by name. Its position is so clearly stated that if the Motor Truck were properly differentiated in the public mind from the Automobile, there would be for the Motor Truck no Credit Problem. Quoting from Governor Harding's letter of May 24, 1920, to Senator Owen:

"The Board is insisting that all Banks use a discriminating judgment in making loans, giving preference to those which are necessary for the production and distribution of the basic necessities of life, such as clothing, food and fuel."

Those Banks in certain parts of the country who are refusing to discount Motor Truck paper are acting on their own initiative, and not because of any rulings of the Federal Reserve Board. Quoting from a statement (X-1927) made by the Federal Reserve Board and released for publication May 19, 1920:

"It is the view of the Board that while Federal Reserve Banks may properly undertake in their transactions with member Banks to discriminate between essential and non-essential loans, nevertheless that discrimination might much better be made at the source by the member banks themselves. The individual banker comes in direct contact with his customers; he is better qualified than anyone else to advise the customer because of his familiarity, not only with the customer's business, but with the general business condition and needs in his immediate locality. In making loans he is bound by no general rule of law as to the character of the purpose for which a loan is being asked. He is entirely free to exercise discretion and make one loan and decline another as his judgment may dictate."

In order to further corroborate the above statements, we are presenting herewith copy of a letter received by us from Mr. M. B. Wellborn, Governor, Federal Reserve Bank, Atlanta, Ga., which is indicative of a wide and constructive knowledge of the country's needs, and of a thorough comprehension of the Motor Truck as a means of transportation and production; and, therefore, in itself, a potential factor in relieving the present strain on credit.

(Reproduction of Mr. Wellborn's Letter)

May 31st, 1920.

Dear Mr. Thomas:

Replying to your telegram of May 29th, with reference to my views as to the action of the Federal Reserve Bank of Atlanta in connection with rediscounting automobile paper and the distinction made between what is termed pleasure automobiles and the trucks and tractors—the credit situation at this time is such that I feel we have reached a point where it is imperative that we should have an intelligent and discriminating policy of control over credits, especially those extended for pleasure and luxuries, and for that reason we are restricting credits for financing the purchases of pleasure automobiles.

I think that at this time when transportation facilities are so badly crippled we are doing a useful public service in continuing to grant credits for financing trucks and tractors.

At the present, the credit situation is pretty closely interwoven with transportation; commerce being tied up due to lack of transportation of necessary goods. The false policy of the public for years past in regard to the common carriers injured them to the extent that their credit has been greatly impaired and the public is now suffering as the result of their treatment of the railroads.

I feel that anything that can now be done to encourage production and the sale of motor trucks will be of real value to the transportation problem; and in view of the shortage of farm labor and the necessity for increased production of foodstuffs, I think the entire country will benefit from the manufacture and sale of tractors.

Very truly yours,

(Signed) M. B. WELLBORN,

Governor.

The facts herewith stated and my investigation warrants me to offer to the Manufacturer of Motor Trucks and his Dealers the following conclusions:

First, that the Federal Reserve Board has not ruled against the acceptance of Motor Truck Paper. Further, in its insistence, "That all Banks use a discriminating judgment in making loans, giving preference to those which are necessary for the production and distribution of the basic necessities of life," it has placed its seal of approval on the discounting of Motor Truck paper in the minds of men who have analyzed our present problems and who know that these are fundamentally problems of production and distribution.

Second, that when Banks refuse Motor Truck paper and give us their reasons, Rulings of the Federal Reserve Board, these Banks are merely "passing the buck." It is clearly up to the local bank to accept or reject Motor Truck paper. Therefore, the acceptance or rejectance of Motor Truck paper by the local banker, other things being equal, depends upon his knowledge of the facts relating to the Motor Truck and his vision of this great agency in the life of the Nation.

Third, the Manufacturers of Motor Trucks, their Dealers, and all others associated with the Industry must for their own good and for the welfare of the country emphasize the differences that make the Motor Truck Industry a distinct industry. In tracing to their sources the causes of the refusal by Bankers in certain sections of the country to accept Motor Truck paper, which, apart from the general financial situation of the country, was a great surprise to those who comprehend the Motor Truck, we are very frank to say that the refusals were, in the last analysis, a result of failing to make a distinction between the Motor Truck and the Automobile.

Finally, if the Motor Truck Industry is to receive the rights and benefits which belong to it, it cannot allow itself to be associated in the public mind with any other industry, especially an industry that is related to the Motor Truck Industry no more than a piano is related to a typewriter.

It is an old saying, but true, "Man cannot serve two Masters." One of the two Masters who would tolerate such an attempt must suffer. The Motor Truck Manufacturers' Association is exclusively an Association of Motor Truck Manufacturers.

David Thomas, General Manager.

United Tire Concern Opens Branch in Philadelphia

PHILADELPHIA, July 25.—The United Tire & Rubber Corporation, of Wilmington, Del., has opened a Philadelphia branch at 1624 Arch Street, under the management of W. T. Bosworth, for four years with N. Snellenburg & Co.'s Automobile Department and one of the active members of the Motor Truck Association of Philadelphia, and of the Philadelphia Accessories Association. W. L. Porter, for a number of years connected with the Falls Tire Co. of this city is fiscal agent for the United Tire & Rubber Corporation here, their executive officers being located in Wilmington. They manufacture their own tires and tubes under the United Brand and are Eastern distributors for Erie branches in other cities, including Baltimore and Washington, in addition to the branches already established in Chester, Wilmington, Harrisburg and here. They have leased the entire building at 1624 Arch St., and remodeled it for their purpose.

The executive officers of the Wilmington Corporation are L. H. Beardslee, President; W. G. Taylor, Mayor of Wilmington and Vice-President; W. F. Saltmarsh, Treasurer; Walter S. Keen, a prominent Wilmington business man, Secretary.

The Resiliency is Built in the Wheel

This is Why 500 Truck Dealers

Sell and Indorse Sewell Cushion Wheels

Because Sewell Resiliency is *Unlike* Any Other— It is Permanent

Such advantage of Sewell Permanent Resiliency hardly needs comment. Nothing less than complete supremacy in endurance and economy could result.

Progressive truck dealers everywhere realize the indispensable value of Resiliency in efficient and economical motor truck operation, but at the same time they know Resiliency in its ***most economical form*** must be employed, that of the Permanent Resiliency Built in the Sewell Cushion Wheel.

They have found by actual experience that when their trucks roll on Sewell Permanent Resiliency they have a longer life with more efficient and continuous service, that they rarely frequent their service stations for repairs or replacements.

But in the final analysis they ***know*** beyond all doubt that by recommending Sewell Permanent Resiliency the owner is never going to be confronted with continual costly repairs and replacements, because Sewell Resiliency is One Cost—Permanent Resiliency.

Sewell Cushion Wheel Company, Detroit

Branches, Distributors and Service Stations Throughout the United States

Electro-Magnet Expedites Loading

(*Continued from page 30*)

crane, it is the usual procedure first to equip the truck body, or truck platform, fore and aft with blocks a few inches high and the width of the truck, in order that there may be room beneath for the crane chains to pass. In lifting boiler tubes with the magnet, the trucks do not have to be fitted with blocks in this manner, for, of course, no chain or rope slings will pass beneath the material to lift it. The company has handled with the magnet large rounds up to six inches and saved much time in the matter of hooking on and taking off crane chains. All this, of course, makes for economy.

Although a little more time may be spent in the actual lifting of a given quantity of boiler tubes by magnet than by chain sling, the operations of loading and unloading, Morris, Wheeler & Co. assert, are in their entirety more rapid when the magnet is used, because of the elimination of blocking under loads, "fussing" with sling adjustments and making false starts in lifting and lowering all, more or less, concomitants of sling operation.

Clamps are used with a chain sling on a crane where large single lifts of plates are to be made. The clamps are placed beneath the bottom plates and care must be used in adjusting them so that there is no tendency for the load to tilt too much. Balance is extremely necessary in raising and lowering by clamps and this method has been abandoned in favor of the magnet for plates, except in the case of single lifts, as mentioned.

As many boiler tubes can be picked up at one time by the magnet as the operator can get contact for. Sometimes tubes arrive and are shipped in crates, in which case the magnet can pick them up just as well through the crate as though they were exposed.

In like manner the magnet can pick up a keg of rivets without there being delay to open the keg.

Tubes may be slid upon a trestle through a box car door, picked up by magnet and carried over to a pile; but plates can be picked out of the car direct and unloaded by magnet in the manner previously described, more rapidly and safely in the long run than by chain or rope sling.

The usual way of storing small boiler tubes of two inches and under, is in pigeon-hole racks. Sizes above two inches are stored, in the warehouse of Morris, Wheeler & Co., in "cradles"—a method original with this concern.

These cradles are of strap iron, made up for the most part of what is known to the trade as 4-inch "T's," bent and riveted into rather shallow U-shape, with a base of three feet and a height of about one foot. After one of these cradles has been filled horizontally with boiler tubes, another cradle is placed on top of this, and so on. The cradles are self-sustaining and make the tubes lie firmly in place. Sometimes the tubes in the cradles will be piled 13 feet high. With this height, as much as 120,000 pounds has been contained within a storage space 3 feet wide by 20 feet long.

The tubes are carried from the box cars, or from trestles placed just outside the box car door, into the storage cradles by using the magnet. Vertical storing also is done here, but no bars are thus stored that cannot be put away or taken out of standing racks by one man.

Workmen Encouraged to Devise Labor-Saving Apparatus

One important knack in loading and unloading steel and iron, is to make the material "do its own work" as far as possible, and the workmen here are encouraged to find ways of exercising their ingenuity to decrease their labor and strain in handling heavy materials.

It is a stock saying at the plant, that the combination of roller and balance will accomplish almost anything. This seems credible when it is noted how the smallest of the workmen have become expert in handling alone in this way the amazingly heavy burdens as though they were not worth considering.

Drivers of both trucks and teams carry with them "home-made" rollers for unloading. These are made as follows: Two angles, or a channel iron, are bolted to a base block about a foot and a half long, one foot wide and eight inches high. The connecting shaft is set crosswise through the angle irons, held on with cotter pins. This shaft runs through a short tube which revolves freely around it. The device cost one dollar to make and, the company says, has proved invaluable.

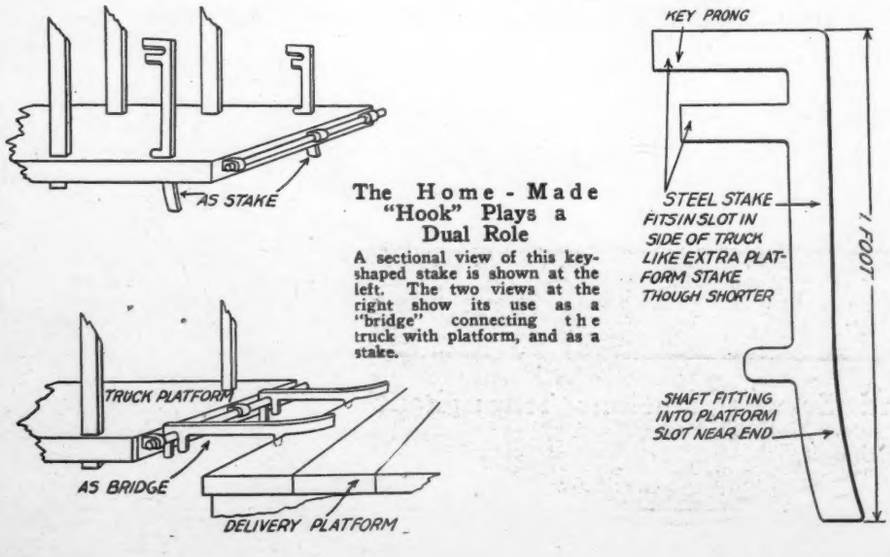
Another and stranger looking "home-made" device original with this shop, is known among the workmen as the "hook." It is a key-shaped steel stake, about a foot long, having a handle and two prongs at right angles thereto, the handle being fashioned to fit into a socket, or slot in the platform of the truck body, as though it were an extra stake, which, in fact, it is. Its main use is that of a "bridge" between the truck body platform and a building, or pile which cannot be approached any closer than its length, over which to roll, or shunt material which it is desirable not to drop, or that is too long to lift with ease.

By means of this short bridge of steel, insignificant though it looks, one man can unload shapes and bars that otherwise might prove extremely burdensome.

The "hook" is often used to enable one man to unload heavy steel without having it hit the wheel, or hub of his truck.

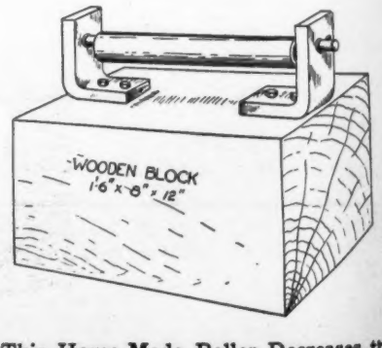
Hand loading is done, too, from the cold rolled steel room just outside the warehouse side entrance toward the shipping building. This is steel that is grease-coated and kept at a somewhat uniform temperature. Here also are loaded by hand on trucks and wagons galvanized sheet iron, black sheet iron, 12-gauge and lighter, and hoop iron, both galvanized and black.

In unloading box cars containing rounds, while waiting for trucks, trestles, two and a half feet high, somewhat resembling saw horses, are used to slide the rounds out by hand. This keeps the material supported at just the proper height for the easy slipping beneath of the chain sling for hoisting by crane to truck, pile or rack.

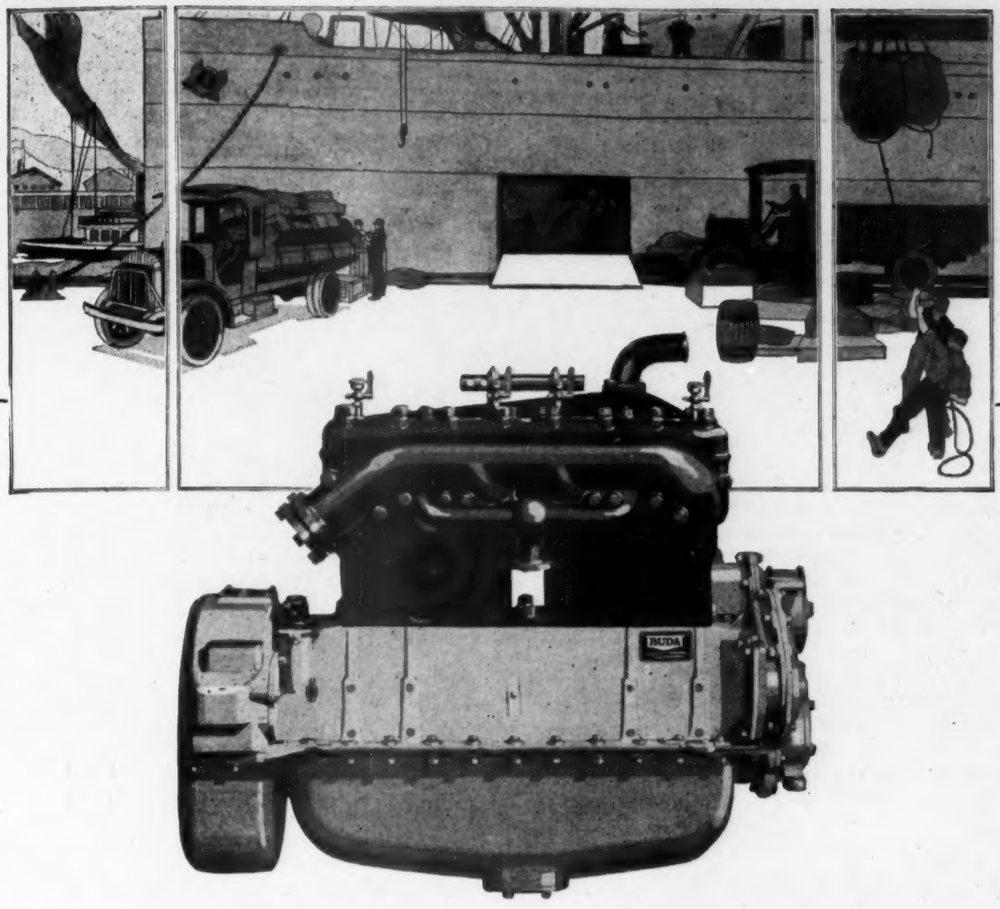


The Home-Made "Hook" Plays a Dual Role

A sectional view of this key-shaped stake is shown at the left. The two views at the right show its use as a "bridge" connecting the truck with platform, and as a stake.



This Home-Made Roller Decreases the Labor of Loading Heavy Material



MEN selling Buda-equipped trucks in every section of the country tell us that the Buda name plate is readily accepted as a pledge of satisfactory engine performance.

This gratifying result has been achieved by a constant adherence to the quality engine building methods developed by 39 years of engineering and manufacturing experience.

In heavy pulling over rutted farm fields, as in meeting the everyday demands of commercial haulage, the Buda engine has served unfalteringly, sparing of fuel, and notably free from mechanical trouble.

Believing the good character of their products is best protected by a quality-built engine, 87 representative automotive manufacturers have now standardized upon the Buda engine.

THE BUDA COMPANY, HARVEY CHICAGO SUBURB ILL.

ESTABLISHED 1881

BUDA
The
ENGINE

Pneumatic Tires and Higher Speed Engines for Trucks

By GEO. A. WEIDELY, Vice-President and Chief Engineer,
Weidely Motors Co., Indianapolis, Ind.

THE advent of good roads and the use of pneumatic tires for commercial cars has brought before the truck manufacturer a new problem. The farmer, who at the present time is a very large buyer of motor trucks, wishes to take a load to town at a fair rate of speed. Also, after getting rid of his load, should he find it necessary to return empty, insists on returning home at practically passenger car speed. Manufacturers of all kinds, express and overland transportation companies, insist upon the same kind of service, and both the farmer and manufacturer, as well as the man who makes the use of the truck his business, is entitled to the kind of a truck that when used under the above conditions, will give as good service as is now expected from the slow moving solid tire equipped truck when used on improved streets.

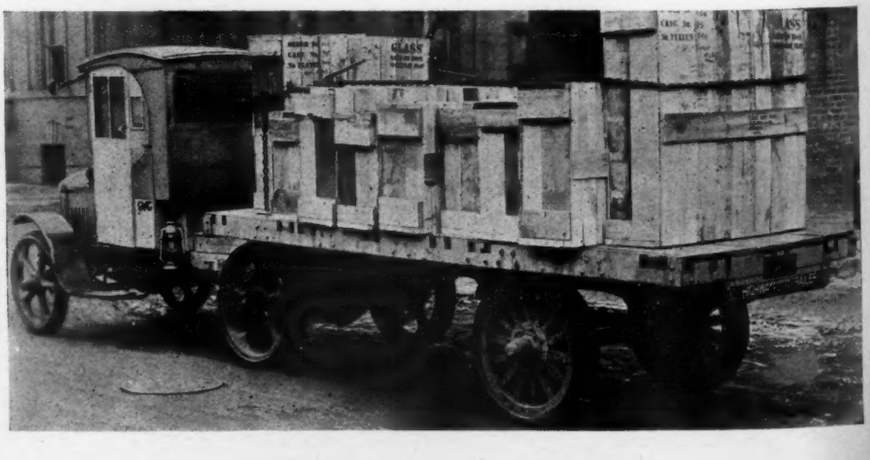
Road conditions in a number of states in the country are such that even fairly large trucks pneumatically equipped and loaded to their rated capacity can operate at speeds averaging 18 to 21 or 22 m.p.h., and the smaller trucks of the speed wagon types with a capacity ranging from 750 to 3000 or 4000 lb., used largely by farmers, truck gardeners, as well as merchants and manufacturers of all kinds, can safely operate at speeds even somewhat higher than the above mentioned speed, depending entirely upon the condition of the roads.

The wonderful work being done through control of the road building by highway commissions will have a great deal to do with the solving of the above problems, but not alone must the road conditions be suitable for the work but the trucks themselves must be designed for this particular service. With the continual rising cost of motor fuels, one of the first things to take up for consideration is a motor design that will give the greatest power output per unit weight of fuel. The general design of an engine should be such as will permit of reasonably high speed. In the writer's opinion the two above mentioned items call in the first place for valve in the head engines, fairly high gas speeds in the passages, a bore and stroke ratio of at least 1 5-10 to 1, and the proportioning of parts that will permit of operating these engines at reasonably high speed continuously.

The average passenger car engine of today, while it may have the ability to operate at high speed on a passenger car, as well as being fairly economical in the use of fuel, is not sufficiently rugged to stand up under the service required of the speed wagon. Also, the water circulating pumps and fans are not likely to be adequate where a truck may at times be expected to operate for some time in low gear. On the other hand, the heavy duty truck or tractor engine of the present day design, is unnecessarily heavy and its economical operating speeds are too low. The writer is of the opinion that the speed wagon requirements call for engines that will burn low grade gasoline or kerosene, that will operate at normal load at approximately .6 lb. of fuel per hp. hour and that will have the high speed possibilities of the up-to-the minute passenger car engine and the durability and ruggedness of the truck or tractor engine. In other words, it is a hybrid derived from the two.

Grocery Stores on Motor Trucks

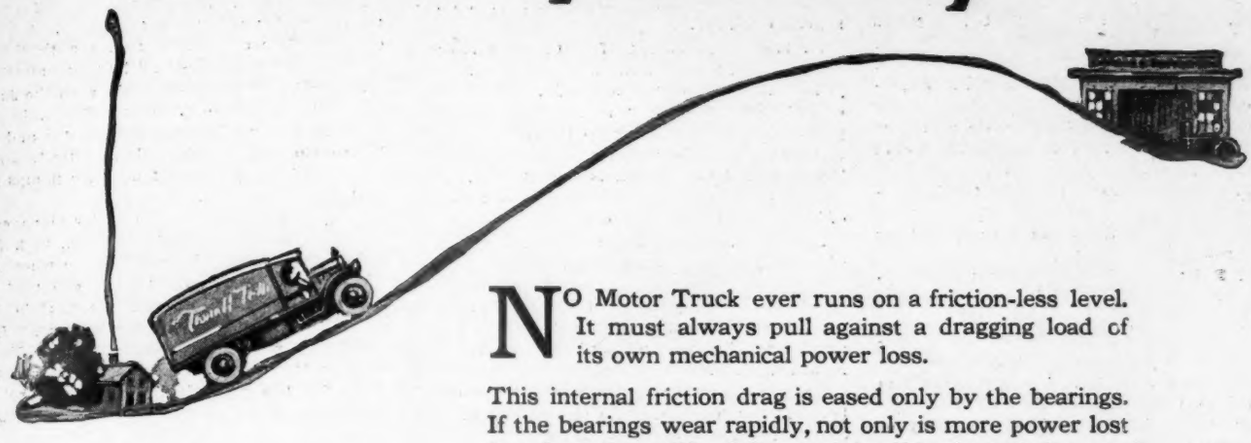
Complete grocery stores mounted on motor trucks are now being successfully operated by C. F. Smith Co., Detroit, Mich. The "stores" built in Saginaw, Mich., by the Lockwood Engineering Co., are fitted with white enamel refrigerators, bread and pastry cases and wire basket shelving. This fleet of moving grocery stores stop at the door, the housewife steps in, selects her purchase pays the driver and steps out and the "grocer" moves on to the next customer. The entire fleet of five trucks are mounted on Sewell Cushion Wheels.



Showing an H-5 Semi-Highway Trailer Behind a Two-Ton G. M. C. Truck With a Load Containing Eight Tons of Windshield Glass.

This outfit is the property of H. A. R. Clark, Detroit, who is using it to transport glass for the Edward Ford Plate Glass Company, Rossford, Ohio, from its factory to the Fisher Body Corporation, Detroit, Mich., a distance of 136 miles. This outfit has just completed its eighty-second trip, totalling 11,152 miles over a period of four months.

Over the Hill— to the Repair Shop



NO Motor Truck ever runs on a friction-less level. It must always pull against a dragging load of its own mechanical power loss.

This internal friction drag is eased only by the bearings. If the bearings wear rapidly, not only is more power lost but the mileage life of the truck itself is shortened.

For bearing wear means misalignment, lost motion, heating and vibration that first racks and then destroys—particularly in transmission and drive.

Automotive engineers agree that properly built ball bearings are the longest wearing bearings made. In proof of this, they are without exception designed into the chassis of the leading truck manufacturers and at points of greatest possible wear.

In S K F and Hess-Bright ball bearings we have not only developed this ball type of anti-friction bearing to its highest perfection, but we have further established a scientific research and engineering organization that is shouldering automotive manufacturers' bearing problems. We are endeavoring to serve American industry through this contribution to the building of better trucks.

Manufacturers are invited to avail themselves of this freely offered co-operation.

S K F INDUSTRIES, INCORPORATED
Sales, Service and Research Division
165 Broadway, New York

(602)

SKF INDUSTRIES

S K F Ball Bearings
Hess-Bright Ball Bearings
Atlas Steel Balls
Gronkvist Chucks
Transmission Hangers

The S K F Research Laboratories where friction problems are solved

S. E. Ackerman, sales manager of the Franklin Automobile Co., Syracuse, N. Y., sailed for Liverpool June 9, to make a general study of European conditions as they affect the company.

J. K. Alline, formerly of the Electric Appliance Co., Chicago, is now Iowa representative for the Packard Electric Co., of Warren, Ohio, manufacturers of transformers and automotive cable.

H. L. Beckwith, for the past five years manager of service for the General Motors Truck Co., at Pontiac, Mich., has resigned. He has been with the GMC since the beginning of the industry.

F. E. Blanchard has been made assistant engineer of the engine division of The Buda Co., Harvey, Ill.

K. C. Burtscher, formerly with the Wheeling and Lake Erie R. R., has been appointed traffic manager of the India Tire & Rubber Co., Akron, Ohio.

R. S. Butler has been appointed advertising manager of the United States Rubber Co., 1790 Broadway, New York.

Otto Bruenauer has been elected vice-president and made general manager of the Chicago Standard Axle Co. The company has moved into the plant at 1300 Fletcher St., Chicago, which has an ultimate capacity of 12,000 worm-driven axles per annum.

Henry Caldwell, formerly automobile editor of the New York Tribune and the New York Herald, has been appointed publicity representative of Hare's Motors, Inc., 16 West 61st St., New York City.

Jay Chamberlin has been appointed manager of the Cleveland branch of the Pennsylvania Rubber Co., of Jeannette, Pa.

C. H. Connelly has become southwestern manager of the Rubber Products Co., Barberton, Ohio, with his headquarters in Kansas City, Mo. His office will control territory from Nebraska to the Gulf, and from St. Louis to Denver.

W. J. Dreyer has been appointed district manager for Colorado and Utah by the Sprague Tire & Rubber Co., of Omaha.

C. M. Eason, widely known in the trade for his development of the tractor business of the Hyatt Roller Bearing Co., has been appointed sales manager of that department, vice B. G. Koether, who is now assistant general manager of the Hyatt Division of the General Motors Corp.

Eric B. Flippen has been made assistant advertising manager of the Briscoe Motor Corp.

L. R. German has been elected vice-president and a director of the Olds Motor Works, Lansing, Mich.

F. R. Granger has become sales manager of the Fort Wayne Tire & Rubber Co., Fort Wayne, Ind.

Personal Items

Charles P. Grimes, who was in charge of most of the dynamometer laboratory tests for the government during the war, and the man who first created successful motion pictures of air currents, has joined the Franklin Automobile Co., Syracuse, N. Y., as research engineer.

H. Harris, president of Bethlehem Motors Corp., Allentown, Pa., has resigned. He joined the corporation's staff for the work of enlarging the plant and establishing big production, and building up the organization. A similar success with the Republic Motor Truck Co., Alma, Mich., is well known. Mr. Harris has analyzed conditions in a number of plants and improved organizations.

Dwight T. Hersey has assumed the duties of sales manager with the Jenkins Vulcan Spring Co., Richmond, Ind., makers of replacement springs for cars and trucks. For several years he was assistant general sales manager of the Splitdorf Electrical Co., Newark, N. J.

Homer Hilton, sales manager of the Oshkosh Motor Truck Mfg. Co., makers of the Oshkosh 4-Wheel-Drive, Oshkosh, Wis., has just completed a nine weeks' trip through the entire South. Business conditions are suggested by his promptly adding four salesmen to his force in that territory. The company's new factory will probably be occupied August 1, as all the material is actually upon the ground.

A. T. Jackson, vice-president in charge of sales of the Emerson-Brantingham Co., is on an extended trip to Europe.

Charles H. John, president and treasurer of the Wisconsin Motor Mfg. Co., one of the principal passenger car and motor truck engine builders in the United States, has resigned to take a long rest after twelve years' connection with his company. Hugo W. Schnetzky, a prominent Milwaukee architect and business man, has been elected president and treasurer.

F. B. Kirkbride, vice-president since the organization of the SKF Industries, Inc., New York, has been elected president, to succeed B. G. Prytz, resigned. Mr. Prytz has been elected managing director of the parent company, with headquarters at Gothenburg, Sweden.

Jos. T. Latchford has been appointed zone supervisor for the Bethlehem Motors Corp., Allentown, Pa., and will have supervision of much extended territory, with his headquarters in Chicago.

George D. Luther has been appointed soliciting agent for The Electric Storage Battery Co., Philadelphia, Pa., and his offices will be at 811 White Bldg., Seattle, Wash.

John Morgan, former vice-president and treasurer of the McGraw Tire & Rubber Co., has been elected president to succeed Edwin C. McGraw, deceased.

S. V. Norton has been appointed service manager for the General Motor Truck Co., filling the vacancy caused by resignation of H. L. Beckwith. Mr. Norton comes from fifteen years' work with the B. F. Goodrich Co. He is well known as an authority on motor truck problems and haulage questions.

James W. Powers, formerly with the Jaxon Steel Products Co., Jackson, Mich., is now sales manager of the Motor Starter and Air Pump Co., 562 Book Bldg., Detroit, Mich., makers of Long Stroke truck tire pumps and garage compressors.

D. M. Rhoads has become sales manager of the Lack Mfg. Co., Paducah, Ky., manufacturers of the Multi-Disc aluminum wheels.

C. D. Rockwood, purchasing agent of the Mason Tire & Rubber Co., Kent, Ohio, has returned from the Far East where, with J. P. Mathews, resident manager of the Mason Rubber Plantations Co., Singapore, negotiations for the acquiring of extensive rubber plantations for the company were undertaken.

J. H. Quackenbush has been made assistant general sales manager of the American Hammered Piston Ring Co., Baltimore, Md. Walter P. Coghland is general sales manager.

F. A. Seiberling, president of the Goodyear Tire & Rubber Co., Akron, Ohio, has been elected president of the Lincoln Highway Association, succeeding H. B. Joy, who became president last December.

G. E. Swartz, formerly mechanical superintendent of the Torbensen Axle Co., Cleveland, has resigned to become manufacturing manager of the Timken Detroit Axle Co., Detroit, Mich.

Calvin F. Troupe has been appointed supervisor of the southern Wisconsin territory of the India Tire & Rubber Co., Akron, O. His headquarters will be Milwaukee, in connection with the Ramler Rubber Co., India, distributors in that city.

B. B. Wolfe has been appointed district sales manager for New Jersey, Delaware, Pennsylvania, Ohio and West Virginia, for the American Hammered Piston Ring Co., Baltimore, Md.

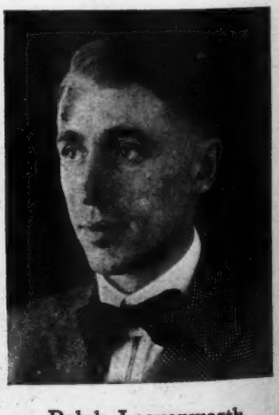
L. J. Waldron has been appointed manager of the Boston branch, for New England territory, of the Pennsylvania Rubber Co., Jeannette, Pa.

Harrie R. Williams, formerly with Homer McKee Advertising Co., is now manager of sales, Milwaukee Automobile Engine Co., Milwaukee, Wis.

H. M. Sloan
Has been recently appointed treasurer of the Buda Co., Harvey, Ill.

C. M. Eason
Recently appointed sales manager of the tractor division of the Hyatt Roller Bearing Co.

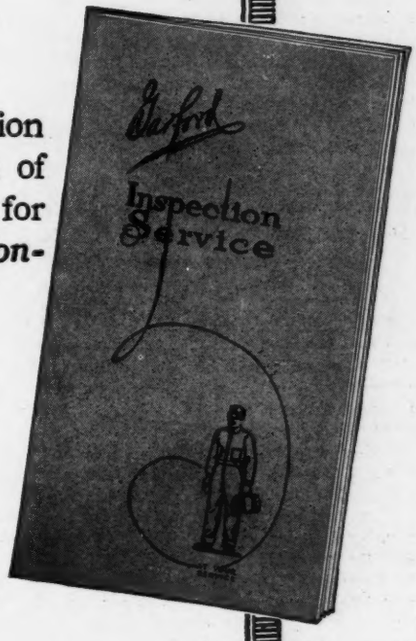
Ralph G. Garland
Recently appointed chief engineer of the Oshkosh Parts Co., Oshkosh, Wis.



Ralph Leavenworth
Who is the new advertising manager of the Standard Parts Co., Cleveland, Ohio.

GARFORD

GARFORD dealer co-operation includes a Direct System of Service from factory to owner for the maintenance of *Low Cost Ton-Mile* operation.



Garford

Lima, Ohio

This potent factor in motor truck merchandising is explained in our booklet "Garford Inspection Service." A copy will be sent you on request.

TRUCKS

New Incorporations

Harloe Tire Co., Winchester, Va., has been incorporated for $500,000, for tire manufacture, and will build a $150,000 plant.

The Pressed Steel Pneumatic Wheel Co. has been incorporated by The Pressed Steel Car Co. of America, with H. S. Autrey, Cleveland, president; M. E. Andrews, Houston, Texas, first vice-president and treasurer. The company will manufacture and distribute the Houston wheel, a successful pneumatic wheel for trucks.

The Hudson Tire & Rubber Co. has been incorporated at White Plains, N. Y., with $1,000,000 capital.

The Dort Motor Car Co. has been incorporated as a Delaware corporation with $47,000,000 capital, by Flint, Mich., residents.

The Hudson Tire & Rubber Corp. has been formed under the laws of New York with capital stock of $1,000,000, and executive offices at 503 Proctor Bldg., Yonkers, N. Y. A factory will be build upon a site recently acquired in Yonkers. W. M. Doucette is president, and H. B. Seymour, vice-president and treasurer.

The Paul Tire & Rubber Co. has been incorporated in Salisbury, N. C., with authorized capital of $2,500,000.

The Norman Piston Ring Co. has been incorporated for $50,000 at Peoria, Ill., to manufacture piston rings for all kinds of motor vehicles.

The Carter Acceptance Co., with $250,000 capital and organized for financing automobile purchases, is established at 210 Stahlman Bldg., Nashville, Tenn., with Capt. Philip Cole, who had overseas service, in charge of the office.

The Miami Tractor & Mfg. Co., Celina, O., has been incorporated with a capital of $200,000 to manufacture tractors for farm purposes. The company will take over a tractor which has been under development for some time.

Personal—Retail Trade

W. W. Alexander has been appointed by the India Tire & Rubber Co., Akron, O., as its direct factory representative in New England territory, with headquarters in Boston. Blakey & Hall, Pittsburgh, Pa., will distribute in that city and adjacent territory. Frank G. Schenuit has been given distribution rights for Baltimore and surrounding territory.

C. M. Barber, Albuquerque, N. M., has signed a contract to distribute Winther trucks in New Mexico, Western Texas, Eastern Arizona and Chihuahua.

Oscar Coolican, manager of the Packard branch, Detroit, Mich will join Hare's Motors as president and general manager of the Philadelphia branch.

H. F. Cogill has been appointed sales manager of the Hurley Motor Co., 829 Fourteenth St., N. W., Washington, D. C., handling Nash cars, trucks and Selden trucks for Washington, and state territory adjacent.

R. L. Dean, formerly White representative in Kern County, Calif., has been appointed manager of the Los Angeles factory branch, covering southern California, for the Garford Motor Truck Co.

Frank M. Foster, Detroit, Mich., will build a five-story sales and service truck station on a 132 x 200 site, with ornamental front and semi-factory rear. Floor space of 132,000 ft. will be afforded. A machine shop, rebuilt truck department, body building and trailer departments will be included.

The Highway Trailer Co., Edgerton. Wis., has three new dealers in Pennsylvania: Harris Welding & Brazing Co., 94 Cameron St., Harrisburg; Service Motor Co., 200 West Philadelphia St., York, Pa., and the Lawfer Auto Co., Allentown, Pa.

William H. Kouwenhoven has been appointed territorial representative for Brooklyn and Long Island for the Locomobile Co. of America, with his headquarters at 2 Remsen Place, Brooklyn, N. Y.

W. A. McMillan, manager of the Fargo, N. D., branch of the Pence Automobile Co., announces occupancy is anticipated for July 1. The building, costing $175,000, is claimed to be the best sales and service building in the Northwest. It has three stories, with floors 75 x 140.

W. M. Vreeland, formerly sales manager of the Tower Motor Car Co., Greenville, Mich., has joined the Duplex Truck Distributing Co., Denver, Col., handling Duplex trucks for Colorado and Wyoming.

Removals and Trade Changes

Atlas Truck Corp. is now the name of the former Martin Truck & Body Corp., York, Pa.

The Automotive Trailer Corp. has moved factory and general offices to Springfield, Ill., in order to take care of increasing business.

The Federal Battery Mfg. Corp., Washington, D. C., has moved its offices to 620 F St., N. W., but the plant remains at 1525 Seventh St.

The Foreign Credit Corporation, acceptors and international bankers, have removed from 37 Liberty St., to 30 Pine St., New York.

The Hartford Battery Mfg. Co. has moved its mail and telegraph address to Milldale, Conn., to combine factory, sales and executive offices.

The Miller Saw-Trimmer Co., of Pittsburgh, Pa., has moved its Philadelphia branch to 141 N. 12th St. to secure larger quarters. John Farnsworth is manager.

Trade Literature

Lubrication via the Marathon Route is a 54-page booklet issued by the Transcontinental Oil Company, Pittsburgh, Pa. It contains illustrations and diagrams showing how the company's lubricants should be applied, and 23 pages of tables, giving name of vehicle and kind of lubricant need in summer, and in winter. The information in this manual comes from the research laboratories of the company.

The Portager, Vol. I, No. 2, being the issue for April-May, the attractive house organ of the Portage Rubber Co., contains 40 pages, and 4 cover pages, copiously illustrated. Besides news and matter of particular interest to the Portage organization this valuable little magazine has articles of pertinence and value to the industry in general.

Brake Lining and Clutch Linings, Sizes and Specifications, used on Passenger Cars and Trucks, published by the Multibestos Company, Walpole, Mass., contains 56 pages of tables. It is a complete list of brake lining and clutch lining sizes and specifications used on motor cars, motor trucks, tractors and motorcycles.

Accesorios para Automoviles, Piezas de Refaccion y Herramientas, Catalogo No. 7, has been issued by Chas. F. Lyngaas Company, 135 Wooster St., New York, and is believed to be the first catalog printed entirely in Spanish, covering automobile accessories, parts, etc. The company is engaged exclusively in exporting automobile accessories, parts and tools, acting as manufacturers, sole export distributors and export jobbers. The catalog contains 129 pages, including index, and is profusely illustrated.

Association News

The first annual excursion and outing of the Automotive Service Associations of Newark, New York and Brooklyn to Bear Mountain, was attended by nearly four hundred men. There were sports for men, women and children. Forty prizes valued at $450 made competition keen. The object of the outing, acquaintance, was very successful, so completely so that next year's outing has been decided upon.

The Used Automobile Dealers' Assn., of Philadelphia, Pa., has been recently formed with Samuel Gorson, president, and Gus Rosenblatt, of the Stanley Automobile Co., secretary. The object is to raise the standards of the used car business, and establish a standard of ethics for the guidance of all dealers.

The Association of Commerce, Madison, Wis., has printed ten thousand copies of a motor guide book, giving trip hints, a city map, and showing ways in and out of city.

M. S. Lines
New district sales manager of the Sprague Tire and Rubber Co., Omaha, Neb., for Illinois, Wisconsin and Minnesota.

F. E. Blanchard
Assistant engineer of the engine division of the Willard Co., Harvey, Ill.

C. S. Whitney
Detroit district manager of wholesale sales, of the Willard Storage Battery Co.

J. R. Carnaham
General sales manager of the Mitchell, Selden Sales Co., 2334 S. Michigan Ave., Chicago, Ill.

MARTIN
CUSHION WHEELS
FOR MOTOR TRUCKS

No Bolts
No Nuts
Pressed on
Throughout
Light
Strong
Resilient
Durable

Backed
by
Nine Years'
Experience
in Building
Good
Cushion
Wheels

Adopted for Standard Equipment on
"OLD RELIABLE" MOTOR TRUCKS
1½ to 7 Ton

MARTIN CUSHION WHEEL CO.
311-13 N. SANGAMON STREET CHICAGO, ILLINOIS
BRANCHES AND SERVICE STATIONS IN ALL PRINCIPAL CITIES
PRICES ON REQUEST

The N. A. C. C. has secured Kenneth A. Moore, formerly general agent of the New York Central Lines, as assistant traffic manager, western district, with office at 1009 Ford Bldg., Detroit, Mich. His work is to facilitate the handling of traffic matters affecting the industry. Captain L. E. Gossett, a graduate of the Motor Transport Corps of the United States Army, is to assist in the rural motor express division.

The Knoxville, Tenn., Automotive Dealers' Association has been organized with H. M. Rice, general manager of the Cadillac Sales Co. as president, and Len G. Broughton, secretary-treasurer.

The General Lead Batteries Co., Newark, N. J., makers of Titan Storage Batteries, have purchased a five-acre tract adjoining their present plant in Newark, with a deep water frontage of 250 feet, and will erect a series of concrete buildings giving 300,000 sq. ft. The company has also purchased, to care for its Western business, a three-story factory building in Chicago, containing 65,000 sq. ft., which will be used for manufacturing and storage.

The F. W. Stewart Mfg. Corp., 345 West Austin Ave., Chicago, Ill., has no connection with the Stewart-Warner Speedometer Corp., the Stewart Products Co., or the Stewart Mfg. Corp.

The Detroit Auto Dash Co. will build a $175,000 additional plant at Milford, Mich., and is financing a housing problem.

The Kalamazoo Motors Corporation, manufacturers of "Kalamazoo" trucks, announce additions to field force: C. B. Summerland, covering Southwestern States; B. H. Dunkley, Indiana, Illinois, Wisconsin and Minnesota; Paul L. Klinger, Southeastern States; Irving A. Milham, Kentucky and Tennessee; and Ralph W. Chapman, Pennsylvania and New York States.

The D & M Cord Tire Co., a $2,500,000 corporation, with a new plant at Warren, Ohio, has filed certificate of extension of their name to The Dennen-Myers Cord Tire Co.

Comotoroperation for June, being Vol. I, No. 1, is the 8 x 11 elegantly papered, printed organ of the Georgia Automotive Dealers' Association, 21 West Peachtree St., Atlanta, Ga. It has six departments, including editorials and news, and is highly creditable to the live associations in "the most northern of southern cities."

The Washington, D. C., Association has had a committee gathering data on a form of bill of sale which it intends to give every owner at the time he purchases a car. Pennsylvania has a law requiring the giving of a bill of sale. Virginia, New York and Missouri, and some other states, have similar regulations. In Washington, D. C., during the year ending June 30, 1919, there were 972 automobiles belonging to residents of the district stolen or "borrowed" by joyriders, and at the close of that period 136 were still missing. Since July 1, 1919, records show that 709 machines were taken and 568 recovered, leaving 136 missing.

The Pennsylvania Section of the Society of Automotive Engineers held its spring outing at Strath Haven Inn, Swarthmore, Pa., afternoon and evening of May 22. Wives, friends and relatives were included. There was arranged a program of sports; there was an excellent dinner, without speeches, and dancing. H. Hollerith, Jr., was chairman of arrangements.

The Louisiana-Mississippi Automotive Trades Assn. will hold its fourth semi-annual convention at Gulfport, Miss., October 6 and 7. Three-fourths of the Mississippi industry is expected to attend. Meetings are held alternately in each state. Nine-tenths, approximately, of the industry in northern Louisiana are members of this association.

The Twin City Motor Truck Trade Assn. has been formed in Minneapolis, with seventy-seven truck dealers present at the organization meeting. W. E. Smith is secretary; J. A. Donnelly, treasurer. Harry I. Defoe is president.

New Publications

Electro-Deposition of Metals, by Dr. Geo. Langbein, and William T. Brannt, eighth edition, revised, enlarged, and entirely reset, 875 pages, 185 illustrations, is the foremost work in English on its subject, and records the most recent processes and apparatus. The size is 6¾ a 9¼ and sells for $7.50, and is published by Henry Carey Baird & Co., 2 West 45th St., New York.

Obituary

Charles Blizard, third vice-president of The Electric Storage Battery Co., Allegheny Ave. & 19th St., Philadelphia, Pa., died on June 12. He was a graduate of the Brooklyn Polytechnic Institute, and became associated with the battery company in 1893, as manager of the New York office. He was a member of the Engineers' Club of New York, Germantown Cricket Club, and the Whitemarsh Country Club.

Charles Ethan Billings, founder of the Billings & Spencer Co., Hartford, Conn., died on June 5, in his eighty-fifth year.

Factory News and Capital Increases

The Philips-Brinton Company, Kennett Square, Pa., manufacturers of the Philbrin Duplex and other ignition systems announces that it has been taken over by the Philbrin Corporation, the new corporation to continue the manufacture of the well-known Philbrin Ignition Systems on an enlarged scale.

The Black & Decker Mfg. Co. maintain a cafeteria which is used by a majority of the firm's personnel from office boy to president. Two pianos allow impromptu concerts at meal time.

Facto Motor Trucks, Springfield, Mass., Adolf A. Geisel, Mgr., expects to occupy its first plant unit July first. Mr. Geisel has been eastern district manager and special representative of the Federal Motor Truck Co. since 1912.

The Huron Truck Co. has been organized at Bad Axe, Mich., with F. W. Kinde, president, and W. R. Lyons, vice-president. A factory building has been leased, and fifty trucks will be produced this year.

The Kissel Motor Car Co., Hartford, Wis., has established an Agricultural Division, and it is being utilized by farmers from every part of the country for settling knotty questions, and obtaining advice, upon the basis of actual facts and figures. The Kissel Agricultural Division is composed of not only the engineering corps of the factory, who for the past fourteen years have been designing and constructing motor trucks, but also the factory's transportation engineers, who have been giving special study and analysis to the farmer's requirements from every angle of farm truck transportation.

The Lavine Gear Co., 60 Keefe Avenue, Milwaukee, Wis., makers of steering gears, is building its third large addition to its factory, which will make a total of 200,000 sq. ft. when completed. A fully equipped chemical laboratory will be installed.

The McGraw Tire & Rubber Co., 1900 Euclid Avenue, Cleveland, Ohio, announces a quarterly dividend of 1¾ per cent. on the preferred capital stock, payable July 1, to stockholders of record of June 20.

The Maibohm Motors Company has declared a regular two per cent. quarterly dividend to stockholders of record of June 15. The company reports April sales 39 per cent. in excess of March and May shipments.

The Greenfield Tap & Die Corporation has acquired 100 per cent. of the common stock of the Lincoln Twist Drill Co., Taunton, Mass. This company manufactures twist drills, reamers and milling cutters, and thus affords the Greenfield corporation a complete line of small tools. The Taunton plant will be enlarged as necessities require. Edward Blake, Jr., is vice-president and general manager of the Taunton firm.

The Leatherman Tire & Rubber Co., Seattle, Wash., will build a plant for manufacturing tubes and tires, with an initial output of 500 daily.

The Kane Pneumatic Shock Absorber Co., Centralia, Wash., plans producing a new passenger car with a patented engine designed by P. W. Kane.

The Occident Rubber Co., Everett, Wash., has bought a site for a ten-unit factory to cost $150,000 for manufacturing rubber goods and tires.

The Prudential Tire & Rubber Co., Erie, Pa., has taken over the plant and equipment of the Boone Rubber & Tire Co. at Chippewa Falls, Wis., and has filed articles in Wisconsin giving its capital as $4,000,000 preferred and 60,000 shares of non-par common, and a $100,000 interest in Pennsylvania.

The Milwaukee Auto Engine & Supply Co., considered the largest maker of Ford and Fordson timers, has increased its capital from $100,000 to $200,000, and a new factory giving 15,000 sq. ft. has been completed, in which last year's output of 500,000 timers will be increased to 1,250,000 in 1920.

The Roberts Cutout and Safety Valve sales of the G. E. Roberts Company will be handled by The Zinke Company, 1323 Michigan Blvd., Chicago.

The Bennett Injector Company, Muskegon, Mich., has bought the A. J. Wood. Mfg Co., Grand Rapids, Mich., and is in production in the plant, with orders on hand calling for full capacity output.

The Wharton Motors Co., Inc., 914 Main St., Dallas Texas, has bought a factory in that city, and plans production of passenger cars, trucks, and tractors.

The Detroit Waterproof Fabrics Co., a recent Michigan incorporation, is completing a mill at 304 to 320 Greely Avenue, Detroit, for the manufacture of waterproof textiles, principally automobile top materials. Production will be marketed through the Pantasote Company, New York, at 11 Broadway, with branch offices in Chicago and Detroit.

The Westinghouse Electric & Mfg. Co. has transferred the commercial and order parts of the meter, fan motor and rectifier sections, supply departments from the East Pittsburgh works to Newark, N. J., in order that the commercial and manufacturing departments may be in closer contact. The office at Newark will be known as the supply sales department.

The C. R. Wilson Body Co., Detroit, has offered $700,000 in 7 per cent. cumulative preferred stock. The March net earnings are estimated at $620,000. New buildings are to be built.

The Pennsylvania Rubber Co., Jeannette, Pa., has declared a regular quarterly dividend of 1¾ per cent. on preferred stock, and 1½ per cent. on common stock, to stockholders of record of June 15.

You want to keep your truck in constant service, prolong its life of usefulness, and keep down upkeep costs. Here are two big helps:

Handling heavy truck wheels with make-shift tools makes even routine adjustments, like greasing bearings, slow and costly—several hours' work for three or four men—and often leads to damage and injuries. With the

Atlas Wheel Crane

one man can remove or mount the heaviest wheel in less than one minute, or grease the bearings on all four wheels in half an hour, with perfect safety to himself and the truck.

The ATLAS WHEEL CRANE is simple in operation and fully adjustable to any size of wheel or tire, including pneumatics. It is ruggedly built, and will handle loads of one ton with ease. Will last a lifetime of ordinary use.

Spring lubrication is generally misunderstood or neglected. Ordinary oils collect grit, which grinds the springs like sandpaper. Regular graphite is good, but hard to apply, and your men keep putting off the job. Rust then forms, the truck is racked by every jolt, and springs break down.

Thomson's Graphite Penetrating Oil

is a perfect spring lubricant, easily applied. Squirted along one side of the spring, it goes through to the other side, dissolving all rust, and depositing a film of pure dry graphite. The oil disappears, and no road grit can adhere. This easy, perfect spring lubrication means longer life for tires and truck.

Ideal also for chain drives. Keeps king pins and shackle bolts free from rust and easily removed. Many other garage uses.

In one pint cans, $1.00. Ask for prices on one gallon cans and drums.

Send for a can of Thomson's Graphite Penetrating Oil on trial (money back if not satisfied), and ask for full information about the Atlas Wheel Crane

Distributors and Jobbers wanted in territory where we are not now represented

THE THOMSON AUTO SPECIALTIES CO.
Dept. A7, 36-38 E. Chestnut St.
Columbus, Ohio

Distributors and Jobbers wanted in territory where we are not now represented

The Globe Rubber Tire Mfg. Co. has declared a stock dividend of ten per cent.

The Dependable Truck and Tractor Company, Galesburg, Ill., has increased capitalization, by an increase in the amount of the common stock, from $750,000 to $1,250,000, the new stock to be sold from time to time to take care of expanding business. C. G. Morse is president and general manager; A. E. Patchin is vice-president, and J. J. Welsh is secretary and treasurer.

The Klaxon Company, 190-218 Wright St., Newark, N. J., will introduce an innovation in the method of handling service repairs in its branches and with its authorized distributors. Except for simple and quickly accomplished needs such as commutator cleaning, instrument adjusting, or diaphragm replacement, Klaxon service repairs will consist in the complete removal and replacement of power plants, factory assembled, inspected and tested.

The Hawthorne Mfg. Co., Bridgeport, Conn., held a liquidation auction sale June 14 for the sale of its building and land. The firm manufactured "Old Sol" automobile and bicycle lamps, and stopped work because of inability to get raw materials.

The National Carbon Co., Cleveland, is offering the Columbia Hot Shot Battery as a source of convenient, safe, effective, camp, cottage and tent light. One Hot-Shot supplies a five-cell power, 6-volt, 2-c.p. lamp. The whole outfit, including switch and cord, occupies hardly more space in a camping outfit than an old-fashioned oil lantern.

The Fisk Rubber Co. is planning the erection of a $5,000,000 office building in New York, at the corner of Broadway, 57th St., and Eighth Ave., which will house the permanent general offices of the firm.

The New England Tire & Rubber Co., Springfield, Mass., has secured an option on 6½ acres of land adjoining the Stevens-Duryea plant and proposes to erect a large plant for manufacturing tires.

Standard Gear Company, 700-704 Commonwealth avenue, Detroit, is the name of the consolidated and re-incorporated firms, namely, Langtry Machine Co., W. M. B. Machine Co., Michigan Standard Gear Co., Detroit Standard Gear Co., and Mead Mfg. Co.

The Akron Rubber Mold & Machine Co., Akron, Ohio, has started extensive factory additions, which when completed will more than double the present 75,000 sq. ft. in use. Tire building and tire repair equipment is made.

The Harroun Motors Corporation, Wayne, Mich., has had its $800,000 claim for war work settled by the government and will proceed with car production. A new model, AA-2, developed by Ray Harroun, vice-president, will be made, with improvements in the engine, chassis, and body.

The Yale & Towne Mfg. Co., Stamford, Conn., has purchased the industrial electric division of the C. W. Hunt Company, Staten Island, N. Y. Increased manufacturing facilities at Stamford will follow.

The Dawson Mfg. Co., makers of the Dawson grease cup, 2012-28 Larrabee St., Chicago, are in their new factory, specially built to enable the company to take care of its increasing business.

The McElrath Tire & Rubber Company, Ravenna, Ohio, is building a large factory and production is expected to begin in the autumn.

The O. Armleder Company, Cincinnati, O., is devoting its production entirely to trucks, and no longer makes the well-known Armleder wagon. Production double that of 1920 is predicted by the firm for 1921.

The Standard Motor Truck Co., of Detroit, Mich., reports that there is a party traveling in the East representing himself as selling Standard trucks and passenger cars. In each case he has offered to the dealer a proposition which involves consignment of trucks and parts and other services which on their presentation should ordinarily cause the dealer to be skeptical. The entire Eastern section of the country is covered by distributors in their respective territories. The Standard Motor Truck Co., of Detroit, does not do any business on a consignment basis. Representatives of authorized distributors will carry sufficient credentials to identify themselves.

The General Motors Corp., which recently purchased the Doylestown Agricultural Works, Doylestown, Pa., contemplates expending $1,000,000 upon plant extension within the next two years, it is understood.

The Cyclone Starter & Truck Co. is erecting a factory at Greenville, S. C., for producing Cyclone starters and one-ton trucks, production to begin about September 1.

The Lake Motor Co., Appleton, Wis., is installing additional equipment to permit a production of 50 engines daily in 1921.

The Hero Mfg. Co., Philadelphia, Pa., makers of Kennedy Internal-Gear Drive Axles for motor trucks, has had a receiver appointed, pending plans for adequate refinancing. The company's position is considered excellent as its assets, principally new buildings, new machinery and raw material, are greatly in excess of its liabilities.

The Kalamazoo Motors Corp., Kalamazoo, Mich., has completed an addition to its factory affording 7117 sq. ft. more room.

The Selden Truck Corp. announces a quarterly dividend of 2 per cent, and 2¼ per cent dividend upon second preferred stock. The Selden Corp. has received from the War Department a citation and certificate of merit: "Assembled the first Government standard three-ton truck and manufactured hundreds of the same for the Government."

The Roller-Smith Co., 233 Broadway, New York, held its annual sales conference at the Bethlehem, Pa., works June 14, 15, 16. Among those in attendance were: F. W. Roller, president, New York; G. L. Crosby, general sales manager, New York; W. J. Shire, eastern sales manager, New York; M. Frankel, western sales manager, Chicago; C. G. Kahant, F. R. Ryan, J. E. Wood, H. D. Baker,

The Hupp Motor Car Corp., which includes the American Gear & Mfg. Co., reports net profits for the quarter ending March 31, as $1,155,580, before Federal taxes.

Electric Storage Battery Co. stockholders will meet July 9 to vote on increasing the company's capital from $18,000,000 to $30,000,000, the proceeds to be used in new plant construction.

Napoleon Motors Co., Traverse City, Mich., has secured stockholders' approval for increasing capital from $500,000 to $2,500,000, half preferred, and half common.

The Steinmetz Electric Motor Truck Corp. has purchased the property of Reus Bros., Arlington, Md., and will build its plant there.

Selden Advisory Council Formed

The Selden Truck Corporation has organized the Seleden Advisory Council, consisting of Selden truck dealers and salesmen, selected from eleven different districts. No member can hold office for more than a year. The council is in reality a governmental body, the Selden Corporation permitting these men from the firing line to come in and give their advice on policies of construction and selling.

To be a representative from a district will be the highest honor that a dealer or a dealer's salesman can possibly expect to have, for it means that he is the direct connection between the factory and every dealer and salesman in that territory, on all matters pertaining to the selling of motor trucks. To fill such a big place means profits personally.

The Selden Advisory Council will meet in Rochester as frequently as it necessary, all expenses being paid by the Selden Truck Corporation, and while the officers of the company will be ready to confer with the representatives, or to assist them in the meetings, unless they are invited to do so no officer of the company, from the president down will be permitted to attend the deliberations. The meetings will be strictly one of Selden dealers and their salesmen.

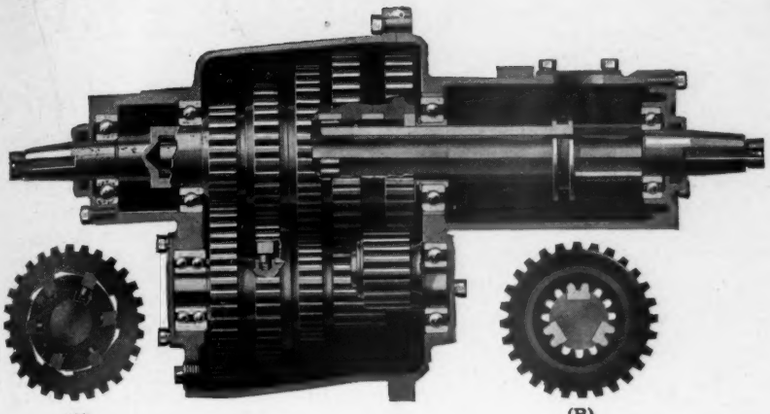
The first meeting will be held early this fall, and in order to secure the best representatives possible from the respective districts an election will be held, primaries in May, and final election in June.

During May every dealer or salesman selling a 1½-ton special will be given a certificate for 500 votes. At the end of the month the few men holding the greatest number of certificates in each district will be considered as elected by the primaries. The election proper will go on during the month of June, every salesman having the right to say which one of the two men of his division will receive the benefit of the votes which he can cast by the power of the certificates which he holds. At the end of June the man having the highest number of votes in his division will be called as representative of that division on the Selden Advisory Council.

After a meeting of the representatives there will be a meeting of the division sales managers, to which all matters brought up at the Council will be referred for action.

B. G. Koether Made Assistant General Manager

B. G. Koether, whose promotion to vice-president of the Hyatt Roller Bearing Co. gratified many in the early part of the year, has now been made assistant general manager of the Hyatt Division of the General Motors Corp. He now devotes his entire efforts to production and has his headquarters at the company's plant at Harrison, N. J. C. M. Eason has been appointed sales manager of the tractor division, of the Hyatt Company, and takes up the work formerly handled by Mr. Koether.



(A) (B)

(A) Full-floating action of dog clutch eliminates "jerking" when changing from high to a lower speed.

(B) Cross section of main drive shaft, showing sliding key construction which controls speed selection.

Eliminate Self-Destruction
by Eliminating Gear Shifting

POWER-RITE gears are in constant mesh. Instead of shifting gears you simply select your speed. By mounting the intermediate gears on an overrunning ratchet, speed changes from high to intermediate speeds are effected with the ease and smoothness of speed changes in an electric.

With no clashing of gears—with no jerking or stalling during speed changes—self-destruction is reduced to the absolute minimum.

With POWER-RITE transmissions truck drivers will change gears when they should be changed rather than strain the motor by using the wrong speed.

POWER-RITE transmissions, which are made to fit all trucks from ¾-ton to 5-ton in either the unit or amidships type, show a saving in weight of 25% to 30% over conventional types.

Production plans contemplate fall deliveries. In the meantime we are desirous of having every person in the truck industry, as well as every person interested in trucks, thoroughly informed regarding POWER-RITE transmissions. So do not hesitate to write us for any information you desire.

POWER-RITE transmissions are furnished optionally with either stick control or our specially designed steering-post speed selector.

The Detroit Transmission Company
166 Lycaste Avenue Detroit, Michigan

POWER-RITE TRANSMISSION
CONSTANT MESH

Look for Many Motor Vehicle Bills in 1921

A NOTE of warning is sounded to dealers and manufacturers in the automotive industry in Bulletin No. 3, recently issued by the Motor Vehicle Conference Committee of the National Automotive Chamber of Commerce. Dealers, particularly, should lend their efforts in helping along the good work done by this committee. The summary, given in the afore-mentioned bulletin, follows:

The year 1920 is an off year for state law-making, in spite of the great array of motor vehicle bills which have already been considered, and the great number of them which have already become law. Most of our state legislatures meet biennially in the odd-numbered years, so it is in 1921 that a deluge of motor vehicle bills and laws may be expected. Next year over forty states will hold regular sessions of their legislatures and reports at hand indicate that the remaining states will, in all probability, hold special sessions. If this proves true and if the rate of motor bill introductions which obtained this year is maintained next year, the Motor Vehicle Conference Committee will have fully 4,000 measures to examine and follow the progress of in 1921.

Subject Matter of Bills

In this connection it is interesting to note that, with slight exception, all the motor vehicle bills introduced this year were centered about a few fundamental subjects which manifested themselves over and over again in the various state legislatures. For instance, Massachusetts, New York and Maryland all considered bills to require motor vehicle owners to take out indemnity bonds as a prerequisite to registration. Measures to increase the annual registration fees for motor vehicles appeared in every state. The licensing of motor vehicle operators, the charging of license fees therefor, and the charging of still more fees for the annual renewal thereof were also common bill topics. Furthermore, size, weight and speed restrictions, the necessity of providing motor vehicles with certain equipment and regulations for the operation of motor vehicles came in for much attention. Doubtless these same subjects will be dealt with even more extensively and more insistently next year.

While there is, beyond doubt, a great need for state laws along these various lines, yet there is no occasion whatever for the drastic provisions which many of them, existing as well as contemplated, contain. This is particularly true with regard to the size and weight limitations which certain states are placing upon motor vehicles; the annual fees which they are charging for registration of motor vehciles and numerous other hampering and vexatious restrictions which, while powerless, are nevertheless annoying hindrances to the free and logical development of motor vehicle transportation.

The Motor Vehicle Conference Committee believes that legal provisions of such a sort are premised upon incorrect principles of economics, and government, and that states which apply them to the motor vehicles within their borders are striking body blows at their own welfare. On the other hand the committee is positive that there are certain correct and sound principles upon which motor vehicle laws can and should be based. In consequence, it has helped in the preparation of a so-called Proposed Uniform Vehicle Law, which is designed for general adoption by all of our states, and has also gotten up a similar measure to deal with the great problems involved in curbing the theft of motor vehicles. In additional it is gathering data from which to work out suggestions for scientific and equitable laws dealing with all the other motor vehicle subjects which the legislators are annually called upon to discuss and act upon.

Individual Action Essential

January, 1921, when the legislatures of more than forty of our states will convene in regular session, seems a great way off. Even so, now is the time to get before law makers facts and arguments which will enable them to remove from their motor vehicle laws those features which are bad and add to and keep upon their statute books intelligent and just motor vehicle legislation. The individual members of the six national organizations which compose the Motor Vehicle Conference Committee are therefore urged not only to keep the committee posted regarding the trend of legislative thought in their respective states, but also to obtain from the committee advice and help whereby this legislative thought can be guided into channels which lead to just motor vehicle laws, just to the public, the motor vehicle user and the motor vehicle manufacturer.

A Repairable Radiator

A NEW idea in the line of quickly repairing damaged radiators, recently made its appearance in England. It is an invention of English origin and is the idea of Bernard Deane. It is distributed by H. F. McShane, 9 Copthall Ave., London, E. C., 2. Its main purpose is to render the radiator less vulnerable to breakdown damage.

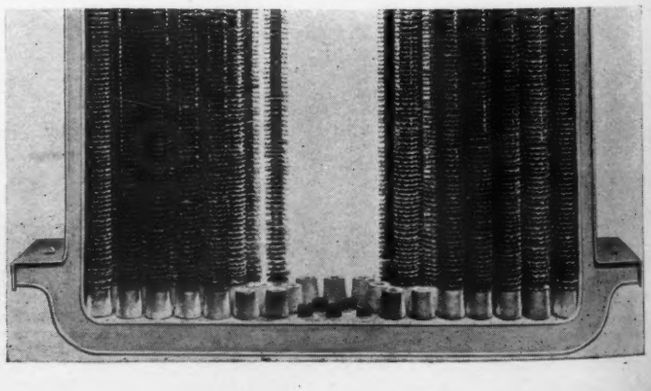
The radiator tube plates are formed with nipples about half an inch high, and on to these are slipped "rubber couplers," as they are called. These couplers have an inner projecting lip at each end, the one connects with the nipple, the other with the tube which is slipped into it. Both make watertight connections.

The tubes are made sufficiently short to enable either end to be slid in its coupler without interfering with the other end, which clears its connection. The flexibility of the rubber permits the tube to be withdrawn. It only takes a few seconds to remove a tube, and about as many to replace one. Apparently the joints can be perfectly tight on the rod, for they have been severely tested on the road. To try the effect of vibration on them also the engine was raced "all out" for ten minutes with the car standing, and at the end of which a final test with blotting paper round each joint failed to indicate any signs of moisture.

On the same occasion, too, some half a dozen tubes were removed, the nipples instantly plugged with small corks and the tubes then replaced without losing enough water to involve refilling the radiator.

It is stated that in a country with a wide temperature range, that the cooling area of the radiator can be adjusted to requirements by simply removing a few tubes and plugging their nipples.

As a manufacturing problem it also has its points, for it is quite conceivable that the nipples might be pressed in one with the tube plate if the latter is of sheet metal, and thus the expense and possibility of leakage from soldered joints can be eliminated.



The Deane Idea Applied to a Ford Radiator With Some of the Tubes Removed to Show the Couplers, and Some of the Couplers Removed to Show the Nipples.

Tonnage *with Speed*

Carrying 4000 pounds *safely* at 25 miles an hour, the Jumbo Highway Express will make many shippers entirely independent of rail transportation.

Equipped with a powerful Buda Motor, Clark Internal Gear Drive Axle with steel wheels and pneumatic tires and built to give straight line drive under load, this new Jumbo model meets the demands of present day transportation problems—tonnage, speed, safety, economy. It opens a new market for dealers. A few responsible dealers are offered direct factory contracts. Write for full details and sales plan.

NELSON MOTOR TRUCK COMPANY
Saginaw, Michigan

Brief Specifications and Equipment

Standard 56-inch tread, Buda Motor, Clark Internal Gear Drive Axle, Clark Steel Wheels with pneumatic tires, power tire pump, power take-off, electric lights, starter, horn, generator and storage battery.

Steel cab with 3-man seat, heavy cushions, foredoors and disappearing curtains opening with doors, clear vision windshield, motometer, hub odometer, pigtail tow hooks, spring draw-bar and many other features. No extras to buy but the body.

JUMBO
The Complete Truck

Cost Figures Prove Trucking Service Cheaper Than Freight

RESULTS that are regarded as of unusual interest have been secured by the Federal Rubber Company, Cudahy, Wis., within the last few weeks.

This data has been secured through the operation by the company of a trucking service between Milwaukee and Chicago. The service will be continued by the company not only to get relief from the congested freight traffic on the railroads but primarily, to secure still more definite and accurate data on operating and maintenance costs of trucks with pneumatic tire equipment.

The Federal company placed in operation on April 5 a three and one-half-ton truck. This truck has made five round trips a week, or one round trip a day. The truck was not operated on Saturday and Sunday. The report for the first three weeks shows, briefly, that this method of transportation is cheaper by nearly $50.

Weather conditions, as reported on the trip sheets, show that there were two days of snow, five days on which it rained and seven days of fair weather. Most of the road between Milwaukee and Chicago is concrete and macadam but there are two spots, one through Zion City, a mile in length, and one between Racine and Kenosha, also about a mile long, which present very bad road conditions.

The gasoline consumed was figured at 30c a gal. Oil was figured at 80c a gal. The truck is depreciated on a 150,000 mile basis and the interest on the investment in the truck is figured at 6 per cent.

Not counting the saving in boxes due to the different conditions presented by truck shipment; not counting the cartage saved by truck operation through elimination of this service in railroad shipment; the actual cost of the operation of this truck for three weeks, including labor and all, was only $405.47 as against $457.80 which the same shipments by railroad would have cost.

The cartage at Milwaukee and Chicago alone would have cost in excess of $100 so that the actual money saving is $150, to say nothing of the better and quicker dispatch the freight received by truck.

Charged against the truck, also was, 8¼ hr. of overtime in one day. This in reality, should not have been charged against the truck. It was acquired while this truck assisted a 5-ton solid tired truck through the sand and towed it into the city in a disabled condition, due to the burning out of a bearing.

The tabulated reports show the truck made 14 round trips from April 5 to 24, that it covered a total mileage of 2806 mi. The average trip was 100.18 mi. The truck consumed 352 gal. of gasoline or an average of 7.966 mi. to the gal. It consumed 15½ gal. of oil or an average of 187.6 mi. to the gal.

The average speed per hr. was 16.66 and the total running time for the 14 trips was 168 hr. and 30 min. The truck handled an average load of 4330 lb. Depreciation charged off amounted to $92.58; interest on the investment, $17.13; crews were paid on the basis of 280 hr. at 40c an hr., and 110 hr. at 60c an hr. The cost per mi. for the total trips amount to .1442c and the cost per ton, .06791c.

When there were no delays in receiving a return trip and no pick-ups to be made other than the warehouse stop the actual time consumed in the trip was 14½ hr. including time off for dinner.

The truck is equipped with 8-in. tires on the rear and 6-in. tires in the front. Tires on this truck have at all times carried a considerable overload. But during the 3106 mi. of road the truck has covered, the tread wear on the casings in the rear has been only 7-46 of an in., according to caliper measurement.

The Federal now has a fleet of the trucks in operation. Interesting data may be expected as soon as the next three weeks' report is ready.

Sales Opportunities in Illinois Road Program

ILLINOIS will distribute oil over approximately 50,000 miles of rural highways this year. The great increase in the use of this fluid has opened a new field for the use of trucks.

Louis Kuhn, Bloomington, Ill., has eight trucks equipped with tanks for carrying and distributing oil. These trucks are of sizes ranging from one to two-ton capacity, and include the following makes: Oneida, G. M. C., Winthrop-Marwin and Republic. Kuhn intends keeping a careful record as to the efficiency and performance of each truck this year. This record will be used as basis for guidance in subsequent purchases the next year.

Each of the eight trucks carries a 900-gal. tank. The fluid is sprayed from the rear, and the flow is regulated by the driver. A force feed pump, connected with the transmission, causes the oil to be evenly distributed over the highways. The adoption of this force-pump system facilitates rapid satisfactory work.

On two trailers, made of two old Ford chasses, are installed 8 hp. gasoline pumps capable of pumping 250 gal. of oil per minute. These pumps are utilized in transferring the oil from the tank cars to the tanks upon the trucks. The trailer with the pump is placed alongside of the tank cars and is kept in operation until each car has been emptied. When a truck has emptied its tank, it is sent back for a new supply and the second truck then starts where the first left off. With a battery of four trucks, the oil can be distributed rapidly, the time being governed somewhat by the location of the railroad station where the tank cars are switched. In some instances a run of ten to twenty miles is necessary.

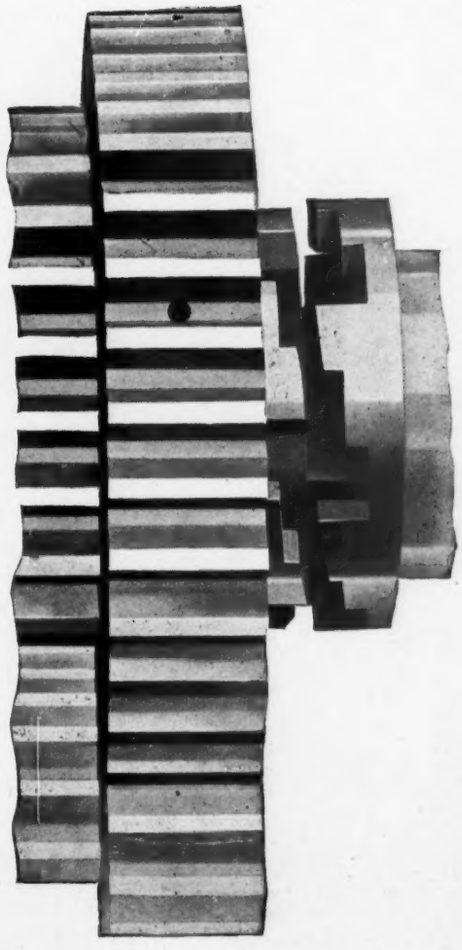
The average cost of the oil is nine cents per gal., placed upon the road. The product used is sixty per cent. asphaltum. Between 4000 and 6000 gals. are sprayed to the mile.

It is customary to give the center of the road four coats of oil and the edges two coats. The cost of oiling a road ranges from $400 to $600 per mile contingent upon the quantity of oil used. Most of the contractors bid upon a job at the gallon rate and then distribute the amount desired by the highway commissioners.

Pending the construction of the hard roads, oil will be distributed as the next best method of treatment. The oil not only reduces the dust nuisance, but also has the effect of saving the road from being cut up after a heavy rain. Dirt roads which have not been oiled were in a deplorable condition this spring, due to the unprecedented amount of rainfall. Because of this comparison, Illinois will distribute a much greater amount of oil this summer and fall than ever before. This furnishes an opportunity for the progressive dealer in trucks and hundreds of sales can be traced to the widespread demand for oil. Dealers who are wide-awake to the opportunity are profiting by the new field, and the heavy demand. Trucks are being almost universally used in all road work in Illinois this year.

This Road-Oiling Outfit Includes a Trailer Which Carries a Gasoline Pump

COTTA
TRUCK TRANSMISSIONS
GEARS ALWAYS IN MESH



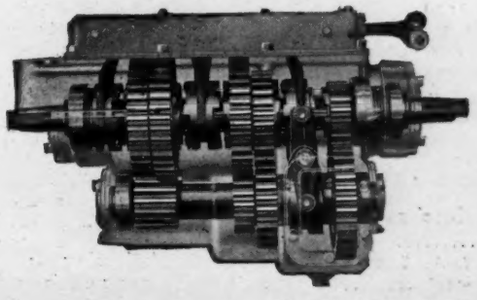
The Strength of a "Six-Jaw" Grip

ENGINEERS know the advantage of distributing a sudden shock equally over many points instead of concentrating it entirely on one spot. By such distribution strains are greatly reduced and destructive wear minimized.

Cotta Jaw Clutch Transmission is designed upon this proved scientific principle to eliminate the wear and tear of speed changing in heavy truck operation. Instead of subjecting only one gear tooth to the sudden and severe shock of engagement in changing speed, the ingenious Cotta Jaw Clutch distributes this shock equally to six strong jaws. As a result, there is only one-sixth of the wear, and twisting strains on gears and vital parts are eliminated. Because of the Cotta Jaw Clutch the gears remain always in mesh and are never shifted. Hence there is no danger of stripping them or otherwise injuring the accurately finished teeth.

Cotta Transmissions are made in 3 and 4 speeds of both the unit power plant and the amidship type. They are guaranteed against gear stripping.

COTTA TRANSMISSION COMPANY
Largest Exclusive Makers of Truck Transmissions
ROCKFORD, ILLINOIS



Metal and Rubber Markets

Labor Difficulties and Freight Congestion Still Handicap Steel Movement

Steel manufacturers are more hopeful of a compromise with their union workers. The steel makers are reported to be steadfast in the determination to reject the radical demands of their union men. Shipping conditions seem to be growing easier, although large stocks still remain piled in warehouses. There is a shortage of bituminous coal because of the railroad labor troubles, but the utilities are protected.

That the railroads are making little headway against steel production is shown by the ever increasing stocks of finished steel products in the yards and terminals of Youngstown and Pittsburgh mills. The glutting stocks are near a 750,000-ton level, with congestion increasing steadily and threatening to revert the situation to that existing before the Interstate Commerce Commission reduced the traffic pressure. The shortage of cars is the prime factor in this development, but the extension of the outlaw strike has repeated the crippling blow of April and early May.

The steel market presents a softer tone, as more free stocks are available for new business, but consumers are severely handicapped by a decrease in receipts of necessary materials in the steel using industries, which are even now far behind schedules.

Steel Products Prices

Per ton—Pittsburgh			
Bessemer billets	$60 00	a	$70 00
Open hearth	60 00	a	70 00
Forging billets	85 00	a	....
Sheet bars	65 00	a	75 00

Sheets

The following prices are for 100-bundle lots and over f.o.b. mill:

Blue Annealed Sheets—			
Pittsburgh (base)	$3 55	a	7 00
Philadelphia	3 80	a	7 25
Chicago	3 82	a	6 77
Galvanized Sheets of Black Sheet Gauge—			
Pittsburgh	$5 70	a	8 50
Chicago	5 97	a	8 92
Tin—Mill Black Plate—			
Pittsburgh	$4 35	a	9 00

Structural Material

Structural shapes, Pittsburgh	$2 45	a	3 75
Structural shapes, Philadel...	2 70	a	4 25
Structural shapes, N. Y.	2 72	a	4 27

Finished Iron and Steel

Steel hoops and bands	$3 05	a	5 50
Tank plates, Pittsburgh	2 65	a	3 75
Tank plates, New York	2 92	a	4 27
Steel bars, New York	2 62	a	4 27
Steel bars, Pittsburgh	2 35	a	4 00
Rails—Standard Bessemer sections, mill	55 00	a	75 00
Stand., open hearth, mill	57 00	a	76 00
Light sections—25 & 45 lbs...	2 45	a	3 75

Iron and Steel at Pittsburgh

Bessemer iron	$44 50	a	....
Bessemer steel, f.o.b. Pitts...	60 00	a	70 00
Skelp, grooved, steel	3 45	a	4 00
Skelp, sheared, steel	3 45	a	4 00
Ferromanganese (80 per cent).	200 00	a	250 00
Steel, melting scrap	25 00	a	25 50
Steel bars	2 35	a	4 00
Wire rods	75 00	a	....
Iron bars	4 00	a	4 50
Plain wire	3 00	a	4 00
Plain wire, galvanized	3 70	a	4 70
Cut nails, nominal	6 19½	a	....
Wire nails, Pittsburgh	3 25	a	4 50
Steel hoops	3 05	a	5 50
Chain rods	60 00	a	65 00

ANTIMONY.—A better feeling is general in the market as inquiries are more numerous, though the actual price is unchanged at 8c and 8¼c retail. Private cable advices from China are to the effect that stocks there are exhausted and internal disturbances make a further supply uncertain. In China quotations now run over 8c for shipments. London is still quoted at £60.

GRAPHITE.—Very little business is stirring and outlook not promising for any increased demand later in the year. Crude Mexican ore is quoted at $31.80 per ton New York. Selected amorphous runs between $45 and $55 a ton. Korean is held at 3¼s a lb., Madagascar 8c a lb., and Ceylon 4¾c to 15½c a lb.

TUNGSTEN.—There is still no business in the market. One price is said to be as good as another, or in other words, inactivity of buyers makes the market nominal. Transportation trouble is responsible, not price, as any reduction would not attract buyers. Nominal prices are $6 to $6.50 for Chinese ore, and $8 to $8.50 for Bolivian.

OLD METALS.—The scrap aluminum market is quiet with prices unchanged. Copper is dull with large consumers out of the market, but there is no pressure to sell, as most dealers are looking for a better market shortly. For lead, heavy smelters are offering 7¼c delivered. None is available below 7½c. Block tin scrap and pewter dishes are scarce and sellers are asking as high as 45c and 37c, respectively.

	Buying.	Selling.
Aluminum—		
Cast scrap	22 a22½	25 a25¼
Sheet scrap	20 a21	22 a22½
Clippings	25 a26	27¾a28
Copper—		
Heavy machinery comp..	13 a13½	15½a16
Heavy and wire	13¼a13¾	14 a14½
Light and bottoms	12 a12½	13 a13¼
Heavy, cut and crucible.	14 a14½	15½a16
Brass, heavy	7⅛a 8	8½a 9¼
Brass, casting	9 a 9¼	10½a11
Brass, light	7 a 7¼	7¾a 8
No. 1 clean brass turn'gs	7¼a 7½	8⅛a 8½
No. 1 comp. turnings	10½a11¼	12¼a13
Tea lead	4 a 4¼	5 a 5¼
Lead, heavy	6½a 6¾	7¼a 7½
Zinc scrap	4¼a 4½	5¼a 5½
Solder joints	10 a10¼	11 a11½
New zinc clippings	5 a 5¼	5 a 6½
Pewter dishes	33 a34	36 a37
Block tin, scrap	41 a43	44 a45

OTHER METAL PRODUCTS.—Following are the prices current for brass and bronze products:

Copper sheets, not rolled	$29 50	a	....
Copper bottoms	38 00	a	....
Seamless tubing, bronze	34 50	a	35 50
Seamless tubing, copper	32 00	a	....
Copper rods	26 75	a	27 50
Copper wire	22 50	a	23 50
Cut lead sheets	12 50	a	....
High brass wire	25 25	a	....
High brass sheets	25 25	a	....
High brass rods	23 75	a	....
Low brass sheets	27 25	a	....
Low brass wire	27 25	a	....
Low brass rods	28 00	a	....
Nickel silver, 18 per cent.	39 50	a	....
Brazed tubing, brass	37 00	a	....
Brazed tubing, bronze	41 75	a	....
Brazed tubing, copper	41 75	a	....
Seamless high brass tubing..	30 50	a	....
Seamless low brass tubing...	33 00	a	....
Sheet zinc	12 50	a	....

Rubber Slightly Down

Extreme dullness pervades the market for plantation rubber, emphasizing the general feeling of depression that has been characteristic of the situation for days past. Nothing new came to the surface in connection with Paras or Centrals, prices remaining nominal in the absence of demand of any consequence.

Para—Up-river, fine	36¾	a	..
Up-river, coarse	26¾	a	..
Island, fine	38	a	..
Caucho, ball, upper	28	a	..
Caucho, ball, lower	26	a	..
Cameta	21	a	..
Plantation—First latex, crepe..	38	a	..
Brown crepe, thin, clean.....	36	a	..
Rolled, brown, crepe	30½	a	31
Smoked ribbed sheets	37½	a	..
Centrals—Corinto	28	a	..
Esmeralda	28	a	..
Guayule, wet	25	a	27
Balata, block, Ciudad	*55	a	57
Balata, block, Panama	*44	a	45
Balata, sheet	*1 00	a	..
Mexican—Scrap	*29	a	..

*Nominal.

SCRAP RUBBER.—Prolonged dullness has developed weakness and, while the market favors the buyer, prices are held at a fairly level range. Stocks are in excess of the present narrow demand.

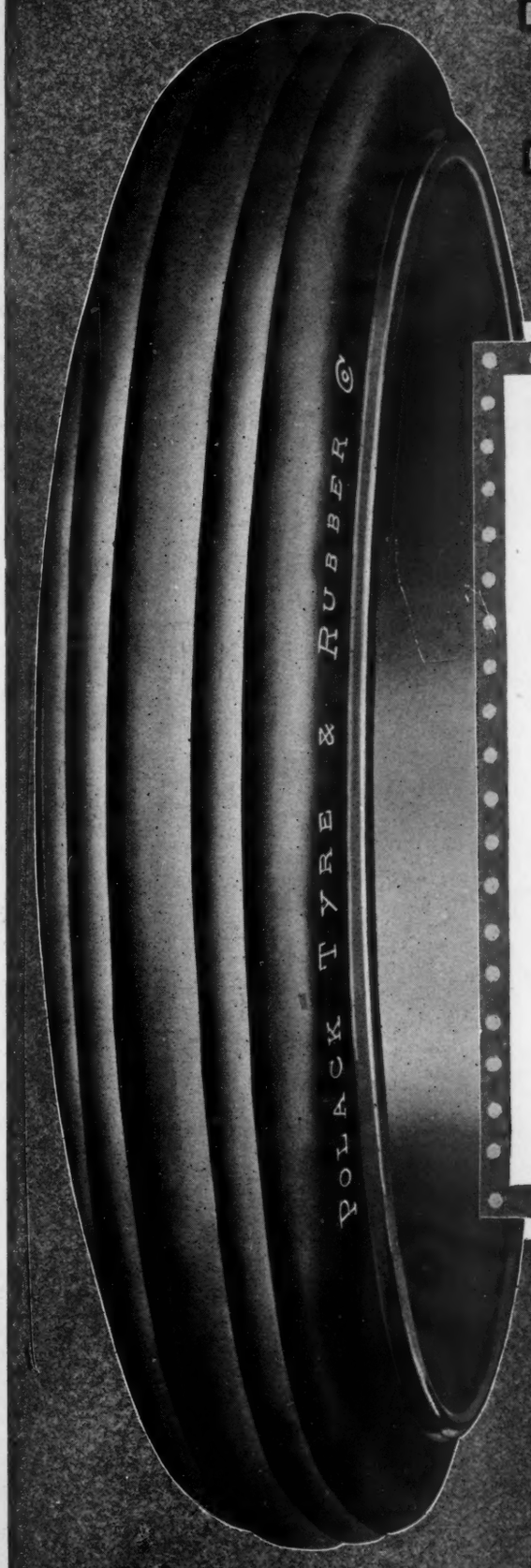
Boots and shoes	..	a	7
Arctics, trimmed	5¾	a	..
Arctics, untrimmed	4¾	a	..
Tires—Automobile	3	a	..
Bicycles, pneumatic	2½	a	..
Hose, steam, fire	..	a	1¾
Inner tubes, No. 1	..	a	14½
Inner tubes, No. 2	..	a	9

Sells Trucks by Airplane

R. L. Williams, president of the Butler-Williams-Wakefield Motor Co., Oklahoma City, distributors for Oklahoma of Patriot trucks and Lincoln standard airplanes, calls upon farmers by airplane and is very successful in selling trucks that way. He tells his pilot to land on every farm that shows a big wheat field, and the farmers gather around the airplane thirty to forty strong. A "move your wheat by truck" campaign starts at once. Five farmers signed on the dotted line at the first stop made, for trucks to be "delivered as soon as possible." Six other landings were made the same afternoon, with the same number of farmers, forty to fifty, crowding around the airplane. A great many farms were visited, and thousands of farmers addressed, in one week's trip.

Mr. Williams reports that the farmers are almost unanimously against "store your grain" and in favor of the "market it quick" plan.

POLACK
TRUCK TIRES



70 to 75% Pure Hevea Rubber in Polack Tires

After everything is said and done, it takes rubber to make a good tire—not alone any kind of rubber—but good rubber—and plenty of it.

Hevea rubber is recognized as the best.

The Government specifies "Hevea" in rubber products subject to severe wearing strain—65% of it for solid tires.

Every Polack Tire contains 70 to 75% of pure Hevea rubber.

That alone puts Polack Tires into a class by themselves —unsurpassed for wear and efficiency.

Distributors in open territory, write us now for our exclusive proposition

POLACK TYRE & RUBBER CO.
1876 Broadway
New York
Branches in Leading Cities

SINCE 1899 WORLD'S STANDARD

What is a Semi-Trailer?

Revenue Bureau Contends It is Part of a Motor Truck. Manufacturers Claim It is a Separate Entity. Payment of Taxes Depends on Which is Right

WHETHER semi-trailers are parts of motor trucks or are separate units is a moot question between officials of the Bureau of Internal Revenue at Washington, and the manufacturers of these articles. Payment of thousands of dollars in taxes on past and future sales of semi-trailers depends on the final answer to the question.

The revenue law imposes a sales tax on automobiles and motor trucks and on parts and accessories for them. It does not mention trailers, and it specifically exempts tractors. A layman would take it for granted that articles not mentioned in the law and not falling within the above-mentioned classes are not taxable. A year ago the Revenue Bureau ruled that tractors, even when sold in combination with trailers, were exempt and that trailers, regardless of the number of wheels they may have, were not parts of or accessories for automobiles or trucks. Trailer manufacturers naturally interpreted this ruling to mean that all types of trailers, including two-wheel, semi-trailers, were not taxable. No returns were made and no taxes paid on sales, and the revenue bureau made no attempt to collect taxes.

Last March, however, the bureau revised its rulings and held that tractors which support a part of the load, and semi-trailers for use with such tractors, are both taxable, the former as an automobile truck and the latter as a part of the truck. Furthermore, it declares that taxes on sales of these articles must not only be paid hereafter, but that the manufacturers must pay back taxes on sales from February 25, 1919. It holds that the taxpayer and not the bureau is responsible for any errors of interpretation of the law even when made by the bureau.

Manufacturers cannot see the logic of the new ruling that semi-trailers are parts of trucks, nor any justice in forcing them to pay taxes on a year's sales which the language of last year's ruling plainly indicated were held not to be taxable.

On the other hand, bureau officials maintain that the exemption of tractors by the law relates only to farm tractors and not to road tractors, and that the following phrase in last year's ruling by the bureau was intended to relate to semi-trailers: "but rear portions of automobile trucks, automobile wagons or other automobile not properly called trailers, are taxable as a part of the automobile." But trailer manufacturers contend that this had reference to truck attachments; that is, assemblies of frames, axles and wheels to be permanently attached to light passenger automobiles in place of the regular rear ends for the purpose of converting used and new cars into light trucks.

How the question of what a semi-trailer is and whether or not it is legally taxable is to be settled is not yet known. Under the motor vehicle laws in many states semi-trailers are required to be registered, to pay registration fees and to carry individual license plates as separate vehicles the same as four-wheel trailers. They are not considered a unit with a truck or tractor when attached. Insurance companies, when writing liability, property damage and collision insurance on trucks and trailers, do not rate them as a single motor truck, but, on the contrary, have a rule which reads: "A tractor or automobile with a two-wheeled body immediately attached shall be rated as a tractor with trailer attached, and not at the single commercial automobile rate."

Manufacturers ask how, with justice, state governments can declare semi-trailers separate vehicles for the purpose of exacting taxes in the guise of registration fees and the Federal Government maintain that they are only parts of trucks in order to exact an excise tax. Either they are separate units or only incomplete parts of a whole; they cannot be both.

The manufacturers would like also to know on what ground the revenue officials hold that semi-trailers are not properly called trailers and why they refer to them as "so-called" trailers or semi-trailers. Who is authority on nomenclature if not those engaged in an industry or art? The man in the street can hardly be referred to as an authority, especially in a new industry. If an article is a "so-called" trailer or semi-trailer and is generally recognized as such, the manufacturers cannot understand why it is not such in fact, and not a part of a truck nor why bureau officials maintain that they are right and others wrong.

Truck Movement Instrumental in Paper Concern's Success

The Cook County Paper Stock Co., which started in business ten years ago with a meager equipment of horses and wagons, is a waste paper concern that last year did a business of more than a million dollars trafficking in old paper scraps. The volume of business now is so large that the company is milling its product in its new million dollar plant.

The tremendous amount of business in 1919 was attributed by Maurice Pushker, general manager of the company, to the use of a fleet of motor trucks. The trucks so expedited the movement of stock that the profits were greater and at the same time the company was able to pay a higher price to its customers.

When the company first went into business fifteen teams and wagons were employed. This number was added to until a veritable caravan of slowly moving vehicles wended its way in and out of the plant. The method was tedious and costly. A driver and his assistant required a full day to make a trip into the business district and back. Much difficulty was experienced in driving in and out of narrow alleys and passageways between office buildings and such places. Six Garford trucks, each of six-ton capacity, now do the hauling. They make trips on two-hour schedules. And they carry much larger loads.

"We hardly know a driver is gone," said Mr. Pushker, "until he is back at the dock unloading a supply of paper."

Mr. Pushker says the trucks have made new possibilities in the novel business. From $10 to $15 a day is saved by the operation of each truck. An unestimated amount of cash is saved on overtime charges of driver and assistants. The trucks do away with congestion and the inconvenience and cost of the upkeep of wagons and teams. They are so constructed that they handle nearly twice as much as wagons. Eight-ton trailers are hooked to the trucks in fair weather, more than doubling the capacity again.

The Cook County Paper Stock Co. has standardized on the Garford truck and soon expects to operate one of the largest fleets in the city.

New Giant Arrow Sign in Los Angeles

A new style of arrow, probably the largest ever built, features the corner of Seventh and Figueroa Sts. in Los Angeles. This giant arrow is painted in orange and blue and can be seen a half mile away. It is 242 ft. long and 10 ft. wide and the location is at the point where the new motor car salesroom and service station of Harold L. Arnold, Distributor of Hudson, Essex and Maxwell cars will locate. At the present time the excavating for the new building is going on.

"Truckportation"

"Truckportation" is a new word that may become a fixture in our language. It is shorter and more readily spoken than truck transportation. It fits in admirably to the written or the printed page, and is a legitimate addition to the special vernacular of the truck industry. The motor vehicle industry is now next to steel in importance, and has, naturally, created a technical and common language all its own. "Truckportation" is one of the largest economic factors of present-day life, and is growing in power and importance by leaps and bounds. It merits a comprehensive, easily used, designation, and this new word seems well suited for the purpose.

Trego Motors Sold

The Symington-Hoffman Co., Baltimore and New York, has bought the assets, designs, trade marks, factory equipment, etc., of the Trego Motors Corp., New Haven, Conn. A few months ago the Rochester Motors Co. was also purchased, and the machine tool equipment of the New Haven plant is being shipped to Rochester, and automobile engines will be manufactured. Sales and advertising of the Rochester-Duesenberg, and also the Trego engines, will be handled by N. G. Rost, vice-president of sales, Rochester Motors Corp., 120 Broadway, New York.

New Gasoline Process

FALL RIVER, MASS., June 15.—A new "cracking" process gasoline plant is being built here, which will extract more gasoline than usual from a given quantity of crude oil. The new process eliminates waste, and a better fuel oil is the by-product. This new refinery is being built from government funds, and the navy department has contracted for the fuel oil, and anticipates a saving of $1,500,000 per year. The contract for the first 3,000,000 barrels of the by-product fuel oil has been awarded by the navy department to Cochrane, Harper & Co., 60 State St., Boston, Mass., and is one year's supply for Uncle Sam's oil-burning battleships.

Twenty-Mile Bus Line

The Fay interurban bus line system, operating motor trucks to the suburbs of Rockford, Ill., with headquarters in that city, has extended its service to Harrison, Shirland and Durand. Express and parcels of all kinds will be handled in addition to passengers. The bus will make two round trips per day, leaving Rockford at 6.30 A. M. and 4 P. M. The run is twenty miles and two hours are allotted to the trip each way. The bus remains at Durand but ten minutes. Mr. Fay is receiving many inquiries concerning his bus line system. Business men of Toledo, Ohio, are asking him to install a similar system there and he may make a survey of conditions.

Suggestions That Lubrication be Featured in Advertising

The Motor Truck Committee of the National Automobile Chamber of Commerce suggests, through its motor truck bulletin, that members carry a line or slug at the bottom of all advertising to impress upon owners the importance of draining the motor every 1000 or 1500 miles (former preferred), cleaning engine with kerosene and refilling with new oil. This slug should be brief and prominently displayed, or perhaps boxed, to catch the eye and the effort continued over a sufficient period to accomplish results.

Suggestions.

"Have your motor drained and clean crankcase every 1000miles—new oil mixed with old is diluted and made useless."

"Proper lubrication means long life to the motor—drain crankcase every 1000 miles."

"Save your motor!—drain crankcase every 1000 miles."

"A motor properly lubricated wears longest."

"New oil diluted with old does not lubricate properly."

"Lubricate with new oil!—new oil diluted with old wears out motor—change every 1000 miles."

"Proper lubrication adds life to the motor—change every 1000 miles."

"Drain crankcase every 1000 miles—do not dilute new oil with old."

"New oil prolongs life of motor!—drain every 1000 miles."

"New oil lubricates most!—when thinned with old wears motor—change every 1000 miles."

"Drain crankcase every 1000 miles and renew—do not mix old oil with new."

San Francisco and Los Angeles Truck Line

An application for a motor truck freight line between San Francisco and Los Angeles has been filed with the State Railroad Commission by W. A. and L. M. Deland, of Richmond, and J. B. and P. K. Nichols, of San Francisco. The application states that the railroads at the present time are unable to handle all the freight without delay and that shippers will welcome a truck line. This is the first application for a through freight line between San Francisco and Los Angeles to be filed with the commission.

Albany to Establish Terminus for Motor Lines

The Albany, N. Y., Chamber of Commerce will establish a general terminus at a central point for the seventy to eighty freight and passenger truck lines operating out of the city, but which have no central terminal.

The various trucks and busses leave at different hours, from different places, causing much uncertainty and confusion. Under the proposed plan a terminal company will arrange shipments, and passenger traffic will be greatly increased.

1920 Credit Convention of M. & A. M. A.

The 1920 credit convention of the Motor and Accessory Manufacturers' Association has been tentatively scheduled for Thursday and Friday, September 16th and 17th, at Cleveland, Ohio.

In view of the vital problems affecting the automobile industry, in relation to the general financial and credit conditions, it is believed that this year's credit convention will be one of the most interesting and most important in the history of the association.

As usual, the credit managers and executives of the various companies belonging to the association—the principal manufacturers of parts, tires, accessories and equipment for the automotive industry—will gather at this meeting, not only to discuss technical credit subjects, but to review general credit conditions in the industry, and exchange viewpoints and experiences on special problems. The outlook in the passenger-car and motor-truck fields will undoubtedly receive special consideration.

Further details concerning the meeting will be announced later.

Automotive Metal Wheel Convention

The Automotive Metal Wheel Association's Convention at the Clinton House, Niagara Falls, on August 10, is certain of a large gathering, and the matter of hub standardization will be given further attention. The axle manufacturers have also promised to attend in force.

Cars Via the Lakes

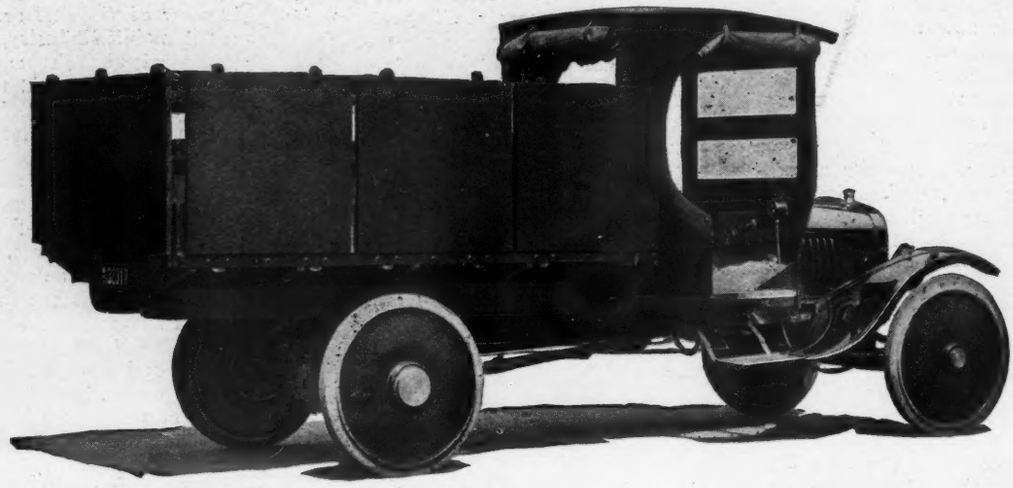
Car shipments from Detroit to Buffalo via Lake Erie are breaking all records on the large passenger steamers. Thirty to fifty new machines is the daily load, not including the usual number of tourists' cars. Electric tractors are used to haul the cars from the steamboats, as no gasoline is permitted on board, and the gas tanks of the cars are drained.

Rhode Island will spend $500,000 for good roads this season, and the State is in the midst of a "Federal aid" program involving $1,281,942 expenditure. It is also on the second year's work of a three-year State program with an appropriation of $250,000 annually. Nine State highway constructions are in progress at the present time, which will add twenty-three miles to the State's roads.

Cornelius T. Myers, the well-known consulting engineer, has moved his engineering office to the Rahway National Bank Building, Rahway, N. J. Mr. Myers has been located at Avenel, N. J., where he carried on work for the Air Service and the Ordnance Dept. during the war, and has now located temporarily in Rahway, on account of the impossibility of securing suitable office space in New York under present conditions. At an early date, however, he will open an office in New York for consultation. He specializes in motor truck construction and design.

The Cornfield Resilient Wheel

Pneumatic Results—and More—With Solid Tires

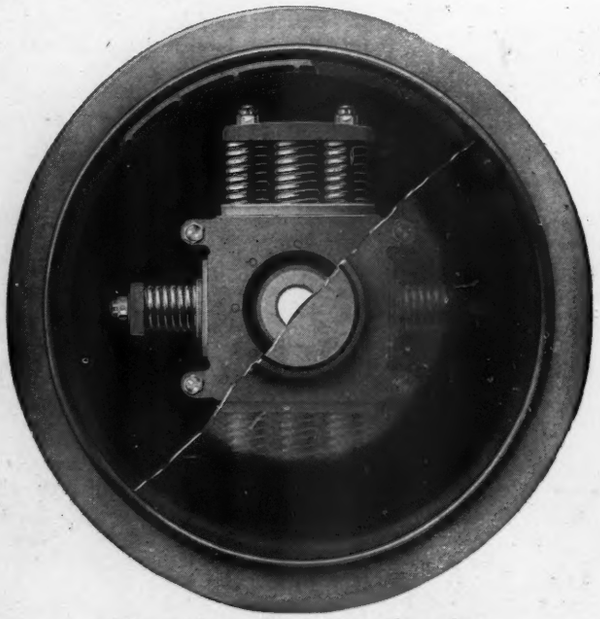


Automotive Engineers Endorse the Cornfield Resilient Wheel the Greatest Achievement in the Truck-Building Field

Numerous mechanical devices have been designed in attempts to stop the injurious vibration of motor driven vehicles.

It has been accomplished to a great extent in passenger cars but trucks still rack to ruin over rough pavements and uneven roads.

The Cornfield Resilient Wheel acts on an entirely different principle. It floats the axle and the entire load.



The spring action is on the axle
Springs do not revolve with wheel

Prominent automotive engineers have given Cornfield Resilient Wheels their approval.

The spring suspension in this wheel is so evenly balanced that the chassis and load are floated. This wheel reduces the resistance to the power of the motor.

It goes a long way toward eliminating vibration. It minimizes tire wear and increases mileage on gasoline used.

Cornfield Resilient Wheels Are Now Made in Full Sets for Ford One-Ton Trucks and Other Light Trucks.

Send for complete descriptive catalog. It shows all details of construction. It is technical enough to prove to the engineer the practical value of the wheel. It is simple enough to be understood by the man who does not know mechanics.

CORNFIELD WHEEL CO.
INCORPORATED
ANNA PLACE, DETROIT, MICH.

THE COMMERCIAL CAR JOURNAL

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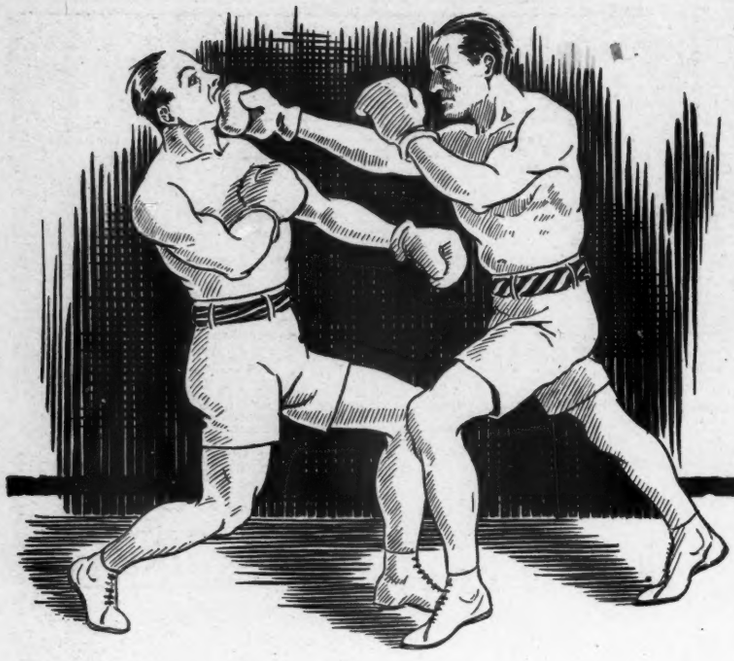
"NORMA"
PRECISION
BALL BEARINGS
(PATENTED)

There is but one true measure of value, viz., the capacity for service. It is a recognition of this fact by responsible manufacturers which has made "NORMA" Bearings the standards in the high-grade magnetos and lighting generators internationally identified with cars, trucks, tractors and power boats of the better class.

See that
your electrical apparatus
is "NORMA" equipped

THE NORMA COMPANY
OF AMERICA
Anable Avenue
Long Island City
New York

Ball, Roller, Thrust and Combination Bearings



The Wise Boxer Trains Down

Not an ounce of fat is found on the trained fighter. He goes into action, a living catapult of bone and muscle, capable of enduring tremendous strains and severe punishment.

There is a pertinent analogy in this for every motor truck manufacturer. The successful motor truck is likewise "trained down" to essentials. Bulky parts are replaced by those of lighter weight and equal strength, which is another way of saying "Bossert equipped!"

Such a truck runs with a decreased overhead and at a low cost per ton-mile.

It is successful because the advantage of its lightness appears on the cost record of the user. Less gas, less oil, fewer repairs, more lasting durability are all experienced by users of Bossert-equipped trucks.

There are 200 Bossert Pressed Steel Parts that could be utilized to lighten your truck's weight without sacrifice of safety. This is "The Bossert Way!"

They are adapted for transmission covers, axle housings, gear covers, step hangers, brake drums, etc.

Our engineers can clearly show you how to eliminate useless weight and lower operating costs. Write them.

You are interested in our capacity to produce Bossert light-weight parts in sufficient numbers to meet your needs. Our factory is enormous—our resources unlimited. Some of the largest presses in the world are at your disposal.

"Build the Bossert Way"

The Bossert Corporation

Main Office and Works: **Utica, N. Y.**

Branch Offices:

Cleveland, Ohio, 611 Citizens Building
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PRESSED STEEL PARTS